

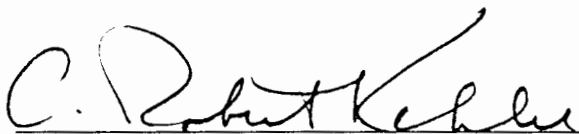
FINDING OF NO SIGNIFICANT IMPACT  
CONCURRENCE PAGE

Launch Rate Increase for DELTA II Program  
at Vandenberg Air Force Base CA

September 1996

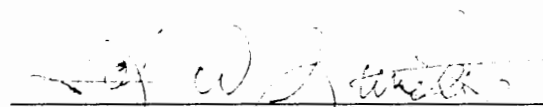
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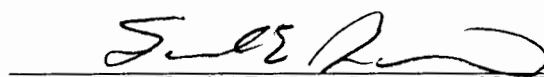
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## **FINDING OF NO SIGNIFICANT IMPACT**

### **ENVIRONMENTAL ASSESSMENT FOR LAUNCH RATE INCREASE FOR DELTA II PROGRAM AT VANDENBERG AIR FORCE BASE (VAFB), CALIFORNIA**

#### **BACKGROUND:**

Pursuant to the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality (CEQ) regulations (40 CFR part 1500 et seq.) implementing the Act, Air Force Instruction 32-7061, Environmental Impact Analysis Process, which implements compliance with NEPA, and other applicable federal and local regulations, the United States Air Force (USAF) has conducted an environmental assessment (EA) of the potential environmental consequences of the launch rate increase at Space Launch Complex-2 West (SLC-2W) Vandenberg Air Force Base (VAFB), California.

#### **PROPOSED ACTION:**

McDonnell Douglas Aerospace (MDA) proposes to increase its existing launch rate of Delta II launch vehicles through increased Department of Defense (DoD), National Aeronautics and Space Administration (NASA), and commercial payloads from SLC-2W from the current permitted level of two launches per year to a maximum of 10 launches per year. SLC-2W is presently operational for the Delta II launch vehicle. Ancillary features of the proposed action are the construction of an access road to address safety issues, and the construction of a new parking lot and the replacement of several trailers with building additions to address space availability issues.

The purpose of the proposed increased Delta II operations from SLC-2W is to fulfill the following needs:

- 1) Maintenance of existing capability to support timely and reliable launch of critical DoD, NASA, and commercial satellites from a location from which highly inclined and polar orbits can be achieved;
- 2) Provision of launch capability for DoD, NASA, and commercial payloads in the 7,500-pound class to highly inclined orbits; and
- 3) Maintenance of assured commercial access to space by providing additional launch capability for the Delta II space launch vehicle for all customers.

Implementation of the proposed action will substantially increase the nation's access to space by providing additional West Coast launch capability of up to 10 commercial, scientific, and government launch vehicles annually without launching over populated land areas. This capability will complement the East Coast (Cape Canaveral Air Station [CCAS]) commercial, DoD, and NASA Delta II launch capability for equatorial orbits. This action to launch additional payloads on an annual basis is the most reasonably cost-effective use of existing facilities and also advances the President's program for assured access to space for commercial users.

## ALTERNATIVES

Alternative actions to increasing the number of Delta II launches from SLC-2W include:

1. Launch from an alternative existing Delta site,
2. Launch from a new site or existing non-Delta site,
3. Different number of launches, and
4. No action.

All alternatives were examined and rejected because each would fail to meet Delta II mission schedule requirements by several years and at higher initial costs. Specifically, for alternative #1, SLC-2W is the only existing facility configured to launch Delta II rockets into polar orbits. SLC-17 at Cape Canaveral is the only other facility configured for Delta II rockets. However, polar orbits cannot be achieved from this facility. Alternative #2 was eliminated, because no facilities exist or could be constructed in time for achieving the existing contracted schedule for payload launches. Alternative #3 was eliminated because the project planning was based on having the capacity to achieve the proposed schedule. Fewer launches would prevent achieving that schedule. Finally, the No Action Alternative would eliminate the project as conceived. Thus, based on these considerations, all alternatives were judged to be inviable and, aside from the No Action Alternative, were not considered further in the EA.

## REQUIRED PERMITTING

The proposed launch increase required that MDA obtain a Coastal Consistency Certification from the California Coastal Commission (CCC) for commercial Delta II launches. Certification was granted on June 12, 1996.

Based upon the findings of the EA, the Air Force has requested formal consultation with the USFWS and requested that the USFWS prepare a new biological opinion (BO) or modify the existing BO.

On September 19, 1995, NMFS issued an Incidental Harassment Authorization, which was based on the assessment of noise impacts discussed by NMFS published in the Federal Register (August 18, 1995). The NMFS concluded that launches of Delta II rockets proposed for this project will not significantly impact harbor seals at the two haul-out locations near SLC-2W. A request for the continuation of the Incidental Harassment Authorization for the period between November 1996 and October 1997 has been submitted to the NMFS. The final letter of authorization is expected to be received in early fall. The proposed action of additional launches will not be instituted until the Letter of Authorization has been issued.

A conformity analysis was prepared resulting in a determination that the overall impact to air quality from the project would not exceed ambient air quality standards. The analysis also determined that the proposed action would not exceed the *de minimis* emissions thresholds for ozone precursors volatile organic compounds (VOCs) and oxides of nitrogen (NO<sub>x</sub>). Additionally, the project is not considered to be regionally significant. Therefore, the proposed project is exempt from further conformity analysis pursuant to 40 CFR 93.153(c) and is in conformity with Section 176(c) of the 1990 Clean Air Act Amendments.

VAFB has submitted a request to the State Historic Preservation Officer (SHPO) for concurrence that selected elements of SLC-2W are not considered contributing elements toward SLC-2W's eligibility to the National Register of Historic Places (NRHP). Facilities proposed for modification in this project are among those for which VAFB is seeking redesignation. Formal redesignation by SHPO is expected in early fall. MDA will comply with all mitigation requirements of the EA/Finding of No Significant Impact (FONSI) and applicable regulatory agencies.

## ENVIRONMENTAL IMPACTS

The EA evaluated the environmental effects of the proposed action upon the following resources: air quality, water resources, ambient noise levels, biological resources, hazardous substances/waste management, socioeconomics, land use, energy resources, cultural resources, health and safety, and soils and geology. A summary of findings is presented below.

**Air Quality:** Emissions of air pollutants may result from construction pre-launch, launch, and postlaunch activities. Construction during the project is expected to result in the emission of 0.78 ton of oxides of nitrogen ( $\text{NO}_x$ ), 0.49 ton of volatile organic compounds (VOCs), 9.86 tons of carbon monoxide (CO), 0.06 ton of particulate material less than or equal to 10 micrometers ( $\text{PM}_{10}$ ), and 0.06 ton of oxides of sulphur ( $\text{SO}_x$ ). Because the construction emissions of these substances are less than 25 tons (Santa Barbara County Air Pollution Control District Rule 202(C)(3) emission threshold), the construction impacts are not significant.

Exhaust emissions associated with the launching of the Delta II include aluminum oxide ( $\text{Al}_2\text{O}_3$ ), hydrochloric acid (HCl), CO, and carbon dioxide ( $\text{CO}_2$ ). Exposure of the general population to potentially harmful concentrations of HCl and CO will not occur. Similarly, exposure of the general population to levels of CO that exceed National Ambient Air Quality Standards (NAAQS) standards is not expected due to the short duration of air quality impacts, infrequent nature of launches, and distance of launches from the general public. Deposition of HCl mist is limited to the area under the rocket itself, HCl mist does not disperse widely, and therefore HCl will not present a significant impact to the surrounding biota.

**Water Resources:** Due to the small incremental increase in water use and short duration of the construction, the proposed project will not adversely affect the quantity or quality of water to VAFB or the surrounding community.

The proposed project will result in an annual increase in demand of 2.9 million liters, which represents less than 0.9 percent of total daily use of water at VAFB. Thus, the annual increase in water demand will not significantly impact VAFB's water supply.

Sanitary wastewater facilities have been constructed to handle the waste load consistent with the increased activity. Under normal conditions, the VAFB water treatment plant at SLC-6 has ample capacity for handling the roughly 130,000 liters of industrial water that would require disposal from SLC-2W approximately every 1 to 2 months. If a substantial rain event occurs prior to the routine time frame for disposal of ignition pulse suppression (IPS) water, water testing will be expedited and water disposed of before large amounts of rain accumulate. If the SLC-6 industrial water disposal facilities are sufficiently full so as to cause an overflow or a high probability of an overflow with the addition of IPS water to that facility, the IPS water will be retained in the SLC-2W retention basin until it can be properly disposed of. In the unlikely

event that such disposal does not occur during the wet season and a launch is imminent, alternative disposal options will be arranged through 30 CES/CEVCC.

Due to buffering and diluting capabilities of the ocean water, accidental releases offsite from a catastrophic destruction of a rocket is not expected to cause significant or long-term effects.

**Ambient Noise:** Based on the low frequency of launches, the distance to residential receptors, and the familiarity of local residents with low-level rocket launch noises, the increased noise resulting from the proposed action will not cause significant adverse impacts to humans.

**Biological Resources:** Approximately 2-1/2 acres of native undisturbed and disturbed habitat will be lost. Mitigation measures will be implemented to minimize native habitat loss, reduce erosion potential, and facilitate the reestablishment of native vegetation. Dune mint, a special-status plant species, is located near the proposed new road right-of-way; however, the road will be situated to avoid these populations. To ensure that no dune mint plants are affected, a qualified botanist will conduct a preconstruction survey. If dune mint plants are identified during this survey, the final road alignment will be adjusted to avoid an impact. The loss of 0.1 acre of potential dune mint habitat will be compensated through the enhancement 0.2 acre of adjacent disturbed potential dune mint habitat.

Road construction disturbance will be transitory and insignificant. To minimize potential disturbances, the footprint of the temporary use areas for construction of the parking lot and road will be kept to a minimum. Topsoil removed from the site will be stockpiled and returned to the unpaved area following construction. Further, to avoid impacts from erosion, the parking lot and road will be contoured to minimize focused runoff. During final design for the parking lot, erosion will be further minimized by installing erosion control devices, if required. Examples of such facilities may include gravel-lined, blind sumps at low spots in the lot or the incorporation of multiple drainage points in the lot contours.

Based on the absence of significant acid deposition during recent launches, no impacts to wildlife are expected from the HCl in the exhaust cloud. Additionally, given the distance to the least tern and snowy plover colonies situated near SLC-2W, there would not be any impact from HCl on the eggs of least terns and snowy plovers.

Because a rocket gains altitude and accelerates quickly after a launch, noise stimuli are necessarily of short duration. Aside from an initial startle reaction, no significant impacts to adjacent wildlife is expected from launch noise.

Given the distance to aquatic resources of roughly 3,000 meters for marine water and 1-1/2 kilometers for fresh water, the attenuation due to the water, and the short duration of the noise, no effects to aquatic animals, such as fish, amphibians, and reptiles is anticipated. Similarly, there is expected to be no impact on fully aquatic marine mammals such as whales and dolphins.

Legally protected animals, including harbor seals and sea otters, hauled out near SLC-2W and least tern and snowy plover nesting areas near SLC-2W will be exposed to excess noise for the short duration of the launch event. Based on their apparent long-term presence at the site, it is expected that the increased number of launches will not significantly impact these species, although a transitory startle effect will occur.

Insufficient data exist to determine the degree that startling could affect Least terns and snowy plovers nesting near SLC-2W. However, least terns and snowy plovers continue to be present at the site after four decades of launch activity, the first two decades of which were at a rate considerably higher than that proposed in the EA. Based on this information, it is expected that the increased launch rates will not have a negative impact to the long-term health of these species at VAFB. To gather additional data to better protect these birds, a program of monitoring will be conducted and consultation with USFWS will be ongoing.

**Hazardous Substances:** Because construction of the road and parking lot is not in areas of known surface contamination, no impacts due to removal of contaminated surface soils are expected to result from this phase of the project. Additionally, as road construction is not expected to disturb soils deeper than 1.2 meters, particularly in low areas, it is not anticipated that trichloroethylene (TCE)-contaminated groundwater or soils will be disturbed.

Renovation or construction of the buildings may occur in areas near the launch pad that have been tentatively identified as containing elevated levels of metals. There is an ongoing discussion as to whether the measured metals concentrations in these areas are significantly above background or are statistically equal to background. Pending resolution of this question, if contaminated soils are disturbed during the building construction, they will be disposed of in accordance with the contingency/response plan discussed below. As with the roadway, these areas also overlie groundwater containing TCE. The same contingencies that will be taken during road construction to avoid disturbance of TCE contaminated soils or groundwater will be used during building construction.

To ensure that TCE impacted soil and groundwater will be avoided, soils will be monitored to detect TCE prior to excavation. In the event that TCE-contaminated soils are encountered, they will be managed in accordance with applicable regulations. Similarly, if contaminated groundwater is encountered during road construction, excavation will be halted and road construction will be modified to avoid exposure to groundwater.

Based on MDA's conformance with the VAFB Hazardous Waste Management Plan and based on the ability of the base to deal with the slight increase in hazardous materials resulting from this project, the impact from the project to hazardous materials use and hazardous waste generation at VAFB is expected to be insignificant.

A contingency/response plan for management of potential releases of hazardous substances (e.g. TCE, metals, etc), due to local presence of soil and groundwater contamination, will be accomplished through the collaborative effort of 30 CES/CEVCR and proponent, prior to commencement of work involving the disturbance of soils.

**Asbestos and Lead-based Paint:** Due to the age of the buildings at SLC-2W, the potential exists that asbestos-containing material (ACM) and/or lead-based paint may be present and could be disturbed during the building modifications. Abatement of ACM and/or lead-based paint or asbestos will be conducted by qualified personnel following all applicable regulations. If required, an asbestos Demolition/Renovation Notification will be completed by the contractor for the project. Notification to the Santa Barbara County Air Pollution Control District (APCD) will be accomplished no later than 10 days prior to demolition/renovation work. In addition, an Asbestos Abatement Plan will be submitted by the contractor and approved by the Office of Environmental Management at VAFB (30 CES/CEVC) prior to demolition/renovation work, and before the Demolition/Renovation Notification to APCD. Disposal of friable asbestos material

will be coordinated through 30 CES/CEVCC by obtaining hazardous waste manifests. All friable ACM will be disposed of at a certified landfill that is permitted to accept this waste. Non-friable ACM will be disposed at the VAFB landfill as Class III solid waste.

Lead-based paint abatement will be accomplished in accordance with established procedures for removal, handling, and appropriate disposal of this waste material.

Material that is contaminated with lead-based paint that meets or exceeds hazardous threshold standards will be disposed as hazardous waste. Material not exceeding the established threshold for lead-based paint will be disposed at the VAFB landfill as construction debris. This category includes bulk waste material that supports intact coatings of lead-based paint.

**Socioeconomics:** No significant impacts to the existing population and local employment are expected as a result of the proposed action. For the short duration of the construction, there will be an economic benefit from the project through increased employment locally and the generation of revenue at local establishments.

**Land Use:** Changes in land use will result from the construction of the roads and parking lot since roughly 2-1/2 acres of dune habitat will be lost. Because much of the land has already been disturbed and the acreage lost is small compared to the surrounding dune habitat, the environmental impacts are insignificant. The increased launch activity will result in a slight increase in the number of beach closures at the nearby public beach, although the proposed action will not cause an exceedance of the historic number of launches during weekends. To minimize potential impacts, MDA will avoid daylight launches during weekends whenever possible. Beach closures will be conspicuously posted well before launch dates to minimize the potential impact to recreational use of the beach.

**Energy Resources:** A small additional demand for energy resources will result from this project. However, the extra demand is well within the normal power delivery system for VAFB and local area grids. As a consequence of this capacity, it is assumed that no significant impact will occur as a result of the proposed project.

**Cultural Resources:** Due to the presence of an isolated artifact identified during the Phase I surface survey at the north end of the new road area, monitoring by qualified archaeologists and Native Americans will be required during all ground disturbing activities associated with the action. SLC-2W has been determined eligible to the NRHP as a historic property associated with operational missions of exceptionally important Cold War programs. Building 1618 was originally considered a contributing element to the eligibility of the site, but has been dropped as a contributing element in the more recent U.S. Army Construction Engineering Research Laboratory (CERL) eligibility evaluation. Consultation with SHPO has been initiated and the Air Force is requesting concurrence with the CERL reevaluation of the contributing and noncontributing elements of SLC-2W and a No Effect Determination from SHPO for the building modification. With this concurrence and the archeological monitoring, no impacts to cultural resources will result from this project.

**Other Issue Areas:** Aesthetics, soils and geology, and health and safety were examined in the EA. Impacts were judged to be insignificant.

## **FINDINGS AND CONCLUSIONS**

Following review of the EA for the proposed action, Launch Rate Increase for the Delta II Program at Vandenberg AFB, securing of appropriate permits, and incorporation of the specific mitigation measures identified above, the proposed action would not result in significant impacts to the environment. Based on information in the EA, this Finding of No Significant Impact (FONSI) is issued. Preparation of an Environmental Impact Statement (EIS) is not required for the proposed action. This FONSI and the supporting EA fulfill the requirements of NEPA, the CEQ implementing regulations, and AFR 32-7061. The EA and supporting determinations are on file at:

Vandenberg Air Force Base  
30th CES/CEVPP  
806 13th Street, Suite J  
Vandenberg AFB, California 93437-5242  
Attn: Environmental Coordinator

The EA and FONSI are available for public review at the Santa Barbara, Santa Maria, and Lompoc public libraries, and at the University of California at Santa Barbara library. Copies of the EA and FONSI may be obtained from the 30th Civil Engineering Squadron, Office of Environmental Management, Attn: Mr. Garry E. Sanchez, 806 13th Street, Suite J, Vandenberg AFB, CA 93437-5320.



**Environmental Assessment for Launch Rate Increase for  
Delta II Program at Vandenberg Air Force Base**

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August 1996

Prepared for  
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Huntington Beach, California

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**LIST OF ACRONYMS**

Al <sub>2</sub> O <sub>3</sub>	Aluminum Oxide
A-50	Aerazine-50
APCD	Air Pollution Control District
AQAPs	Air Quality Attainment Plans
BA	Biological Assessment
BACT	Best Available Control Technology
bgs	below ground surface
BO	Biological Opinion
C	California
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CCAS	Cape Canaveral Air Station
CCC	California Coastal Commission
CEQ	Council on Environmental Quality
CEVC	Environmental Compliance
CEVCC	Compliance Programs
CEVCR	Environmental Restoration
CEVP	Planning
CEVPN	Natural Resources
CEVPP	Program Planning
CEVRC	Cultural Resources
CFR	Code of Federal Regulations
cm	Centimeters
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CSC	California Species of Special Concern
CSLA	Commercial Space Launch Act
dB	decibel
dBA	Decibels A-Weighted
°F	Degrees Fahrenheit
DoD	Department of Defense
DRMO	Defense Reutilization Marketing Office

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EA	Environmental Assessment
EIS	Environmental Impact Statement
ELVs	Expendable Launch Vehicles
EOD	Explosive Ordnance Detail
EPA	Environmental Protection Agency
ES	Environmental Sciences
ESA	Endangered Species Act
FC	Candidate for Federal listing
FE	Federally listed, endangered
FID	Flame Ionization Detector
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GEMs	Graphite Epoxy Motors
g/L	grams per liter
HAZMAT	Hazardous Materials Management Plan
HCl	Hydrochloric Acid
Hz	Hertz
IPS	Ignition Pulse Supression
IRP	Installation Restoration Program
JANNAF	Joint Army, Navy, NASA, Air Force
km	Kilometer
Kg	Kilogram
<	Less Than
LLV	Lockheed Launch Vehicle
LOX	Liquid Oxygen
MBTA	Migratory Bird Treaty Act
MDA	McDonnell Douglas Aerospace Corporation
MECO	Main Engine Cut Off
MELVS	Medium Expendable Launch Vehicle Services
mg/l	milligrams per liter
Mg/m <sup>3</sup>	Milligrams per cubic meter
μg/m <sup>3</sup>	micrograms per cubic meter
ml	milliliter
μPa	micro Pascal
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
mph	Miles Per Hour
MVA	Megavolt Amperes
N	National

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NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
nmi	nautical miles
N <sub>2</sub> O <sub>4</sub>	Nitrogen Tetroxide
NO <sub>2</sub>	Nitrogen Dioxide
NRC	National Research Council
NSR	New Source Review
O <sub>3</sub>	Ozone
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PG&E	Pacific Gas and Electric Company
PID	Photoionization Detector
P.L.	Public Law
PM <sub>10</sub>	Particulate Matter (> 10 microns)
ppm	parts per million
QD	Quantity Distance
ROG	Reactive Organic Gases
RP	Rocket Propellant
SBCAPCD	Santa Barbara County Air Pollution Control District
SE	State listed, endangered
SEA	Supplemental Environmental Assessment
SLC	Space Launch Complex
SLC-2W	Space Launch Complex-2 West
SLV	Small Launch Vehicle
SO <sub>x</sub>	Oxides of Sulfur
SO <sub>2</sub>	Sulfur Dioxide
SPEGL	Short-term Public Emergency Guideline
SR	State listed, rare
SRMs	Solid Rocket Motors
SSC	Species of Special Concern
ST	State listed, threatened
SWRI	Sea World Research Institute
T	Time
TCE	Trichloroethylene
USAF	United States Air Force
USC	United States Code
USFWS	United States Fish and Wildlife Service

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VAFB	Vandenberg Air Force Base
VECO	Vernier Engine Cut Off
VOC	Volatile Organic Compounds

## **1.0 INTRODUCTION**

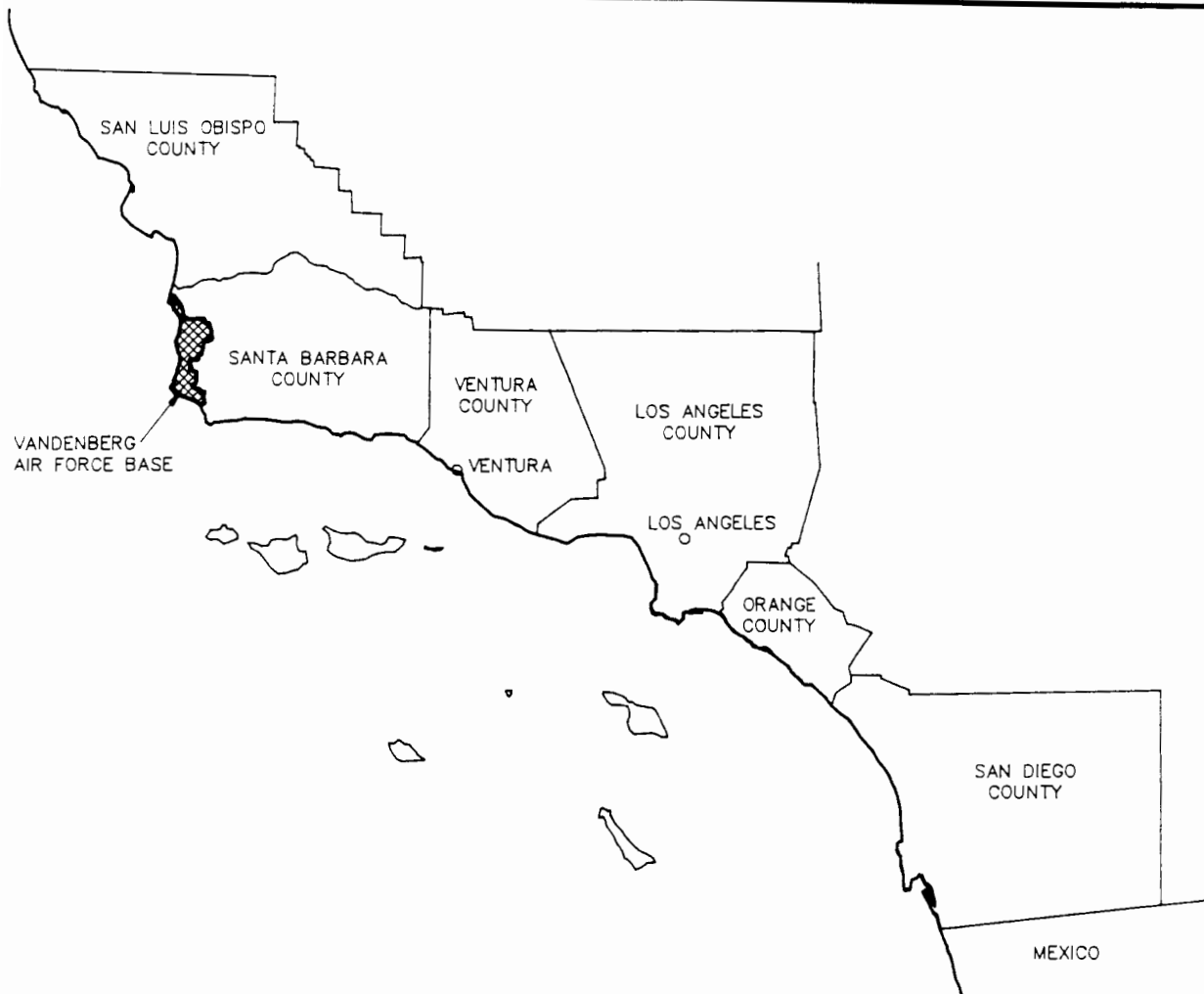
McDonnell Douglas Aerospace Corporation (MDA) requires the capability to place multiple Department of Defense (DoD), National Aeronautics and Space Administration (NASA), and commercial medium-weight payloads into polar or near-polar orbits with the Delta II launch vehicle beginning in 1996. Previous analysis has determined that at present the most cost-effective and safest means of using Delta II rockets for attaining polar or near-polar orbit in the United States is to launch from Space Launch Complex-2 West (SLC-2W) on Vandenberg Air Force Base (VAFB) (Figures 1-1, 1-2, and 1-3). SLC-2W is presently operational for the Delta II launch vehicle, and MDA is currently permitted to launch two Delta II rockets annually. The primary feature of the proposed action covered by this Environmental Assessment (EA) is the addition of eight launches for a total of 10 Delta II launches from SLC-2W annually. Ancillary features of the project are the construction of an access road and the replacement of several trailers with new buildings to address safety issues and base-wide architectural issues, respectively.

### **1.1 Requirement for Environmental Review**

The National Environmental Policy Act (NEPA) and the President's Council on Environmental Quality (CEQ) regulations require Federal agencies to analyze the potential impacts on the environment of proposed actions and alternatives and to use those analyses in making decisions or recommendations on whether and how to proceed with those actions. This EA has been prepared in accordance with Air Force Policy Directive and Instruction 32-7061, Environmental Impact Analysis Process, which implements compliance with NEPA, as required by Executive Order 11514, 42 United States Code (USC) 4321, and the CEQ Regulations, Title 40 of the Code of Federal Regulations (CFR), Part 1500 et seq. This document also satisfies guidelines applicable to environmental review as developed by the Department of Transportation for commercial space launch sites (OCST-RD-ENV01-95, May 1995).

### **1.2 Historic Environmental Review**

An EA and associated Finding of No Significant Impact (FONSI) were prepared by NASA on September 1991 for the modification of SLC-2W to accommodate the Delta II as part of NASA's Medium Expendable Launch Vehicle Services (MELVS) program. The EA/FONSI provided for up to two Delta II launches annually with the limitation that the launches were restricted to occur outside of the breeding period for the California least tern (herein referred to simply as least terns), a state and federally protected species that nests at sites adjacent to SLC-2.



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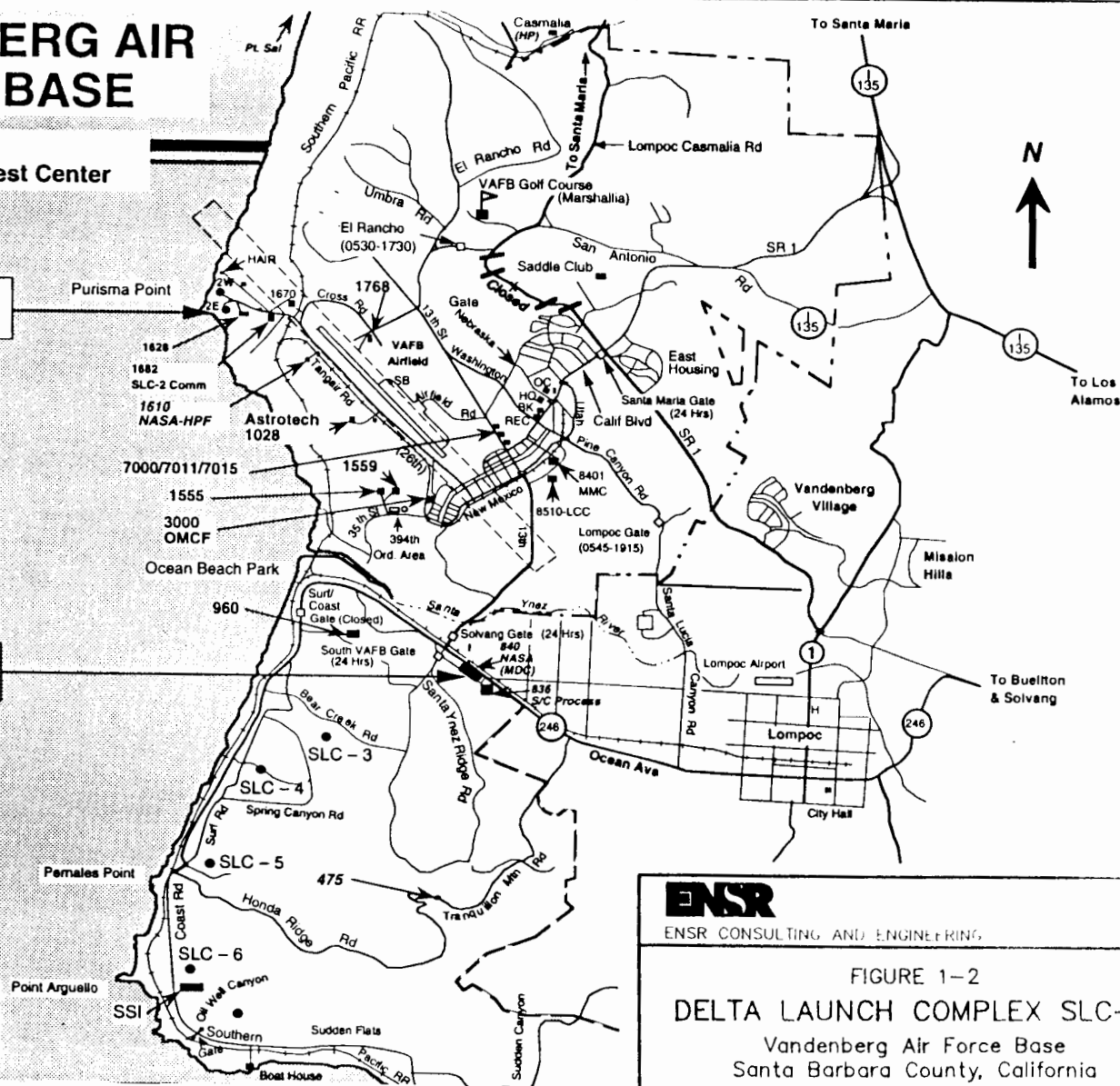
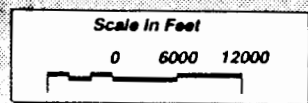
<b>ENSR</b>			
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FIGURE 1-1 <b>REGIONAL PROJECT MAP</b>			
Vandenberg Air Force Base Santa Barbara County, California			
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FILE NO. 4523085k	CHK BY: <i>RE</i>	4523-125-100	

**MDA**  
**Vandenberg Test Center**

**Delta Launch  
Complex SLC-2**

**PACIFIC OCEAN**

## NASA Spacecraft Support Area



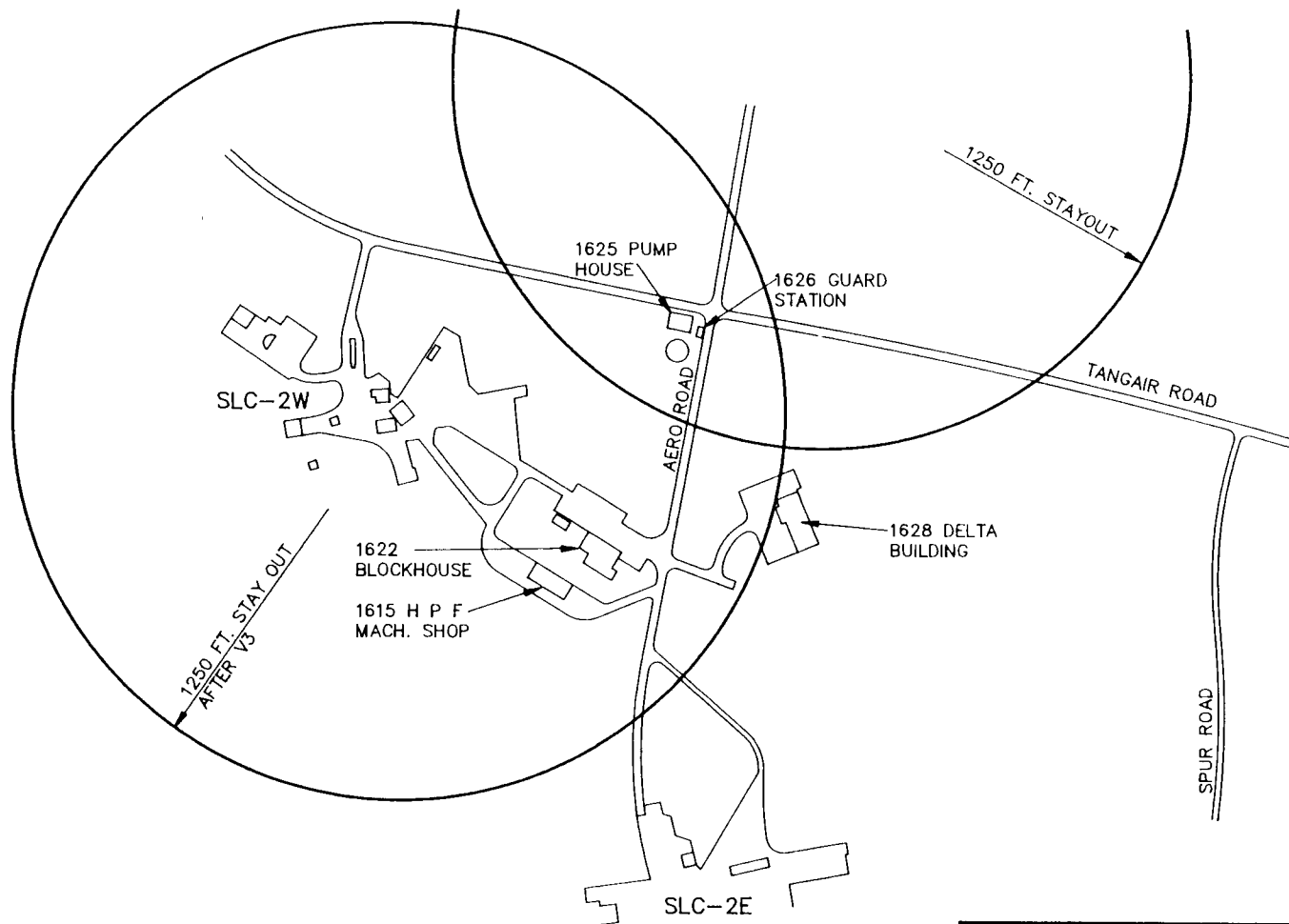
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FIGURE 1-2  
DELTA LAUNCH COMPLEX SLC-2  
Vandenberg Air Force Base  
Santa Barbara County, California

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<b>ENSR</b> ENSR CONSULTING AND ENGINEERING			
FIGURE 1-3 <b>SITE PLAN</b> <b>DELTA LAUNCH COMPLEX SLC-2W</b> Vandenberg Air Force Base Santa Barbara County, California			
DRAWN: M. SCOP	DATE: 1/31/86	PROJECT NO. 4523-125-100	REV.
FILE NO. 4523125a	CHK BY: <i>RE</i>		

Subsequent to the preparation of the 1991 EA/FONSI, but prior to any launches, a Supplemental Environmental Assessment (SEA) and FONSI were prepared by NASA in 1993. The SEA/FONSI allowed for launching year round, including up to four Delta II launches during the least tern breeding season and also evaluated impacts on other biological resources including the western snowy plover (herein referred to simply as snowy plovers), California brown pelican, and California sea otter. The latter three species were not included for evaluation in the original EA. During the preparation of the SEA/FONSI, consultation was completed with the United States Fish and Wildlife Service (USFWS) and the United States Air Force (USAF), and a Biological Assessment (BA) was prepared in 1993 to assess impacts to these species. The USFWS prepared a Biological Opinion (BO) in April 1993 that included mitigation measures to reduce the impacts to these species from launches. The BO concluded that Delta II launches could occur during the least tern and snowy plover nesting season until one flushing of least terns and snowy plovers occurred. At that point, the data on impacts of launches on birds were to be evaluated. The BO presented a series of mitigations to minimize impacts to least terns and snowy plovers.

The following EISs and EAs have been prepared for launch activities at VAFB:

- Environmental Impact Statement (EIS) and Supplemental EIS for the Space Shuttle (USAF 1978, USAF 1983).
- EA for the Peacekeeper program (USAF 1987).
- EA for American Rocket Company's Expendable Launch Vehicle (USAF 1989b).
- Draft EIS for the construction of Space Launch Complex (SLC)-7 (USAF 1989a).
- EA and SEA for Orbital Sciences Corporation's Taurus (USAF 1992, USAF 1993).
- EA for the Lockheed Launch Vehicle (USAF 1994a).
- EA for the California Spaceport (USAF 1995).

This EA builds on information contained in these documents supplemented as appropriate by current information and analyses.

### **1.3 Need for the Proposed Action**

The proposed project consists of two separate components: the increased launch rate and the construction of roads, parking lot, and buildings. These two components are discussed separately in the next two subsections.

### 1.3.1 Launch Increases

The proposed launch increase is designed to advance the goals presented in the Commercial Space Launch Act (CSLA). The CSLA was designed

"to promote economic growth and entrepreneurial activity through utilization of the space environment for peaceful purposes....The peaceful uses of outer space continue to be of great value and to offer benefits to all mankind. Private applications of space have achieved a significant level of commercial and economic activity, and offer the potential for growth in the future, particularly in the United States. The private sector of the United States has the capability of developing and providing private satellite launching and associated services that would complement the launching and associated services now available from the United States Government. The development of commercial launch vehicles and associated services would enable the United States to retain its competitive position internationally, thereby contributing to the national interest and economic well-being of the United States. The provisions of launch services by the private sector is consistent with the national security and foreign policy interests of the United States and would be facilitated by stable, minimal, and appropriate regulatory guidelines that are fairly and expeditiously applied. The United States should encourage private sector launches and associated services and, only to the extent necessary, regulate such launches and services in order to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, and national security interests and foreign policy interests of the United States" (Public Law 98-575; 1984).

The purpose of the proposed increased Delta II operations from SLC-2W is to fulfill the following needs:

- 1) Maintenance of existing capability to support timely and reliable launch of critical DoD, NASA, and commercial satellites from a location from which highly inclined and polar orbits can be achieved;
- 2) Provision of launch capability for DoD, NASA, and commercial payloads in the 7,500-pound class to highly inclined orbits; and
- 3) Maintenance of assured commercial access to space by providing additional launch capability for the Delta II space launch vehicle for all customers.

Implementation of the proposed action will substantially increase the West Coast capability for the nation's access to space by providing additional capability to launch up to 10 commercial, scientific, and government payloads annually without launching over populated land areas. This capability will complement the East Coast (Cape Canaveral Air Station [CCAS]) commercial, DoD, and NASA Delta II launch capability for equatorial orbits. This proposal to launch additional payloads on an annual basis is a reasonably cost-effective use of present facilities and also advances the President's program for assured access to space for commercial users.

### **1.3.2 Construction**

The proposed road construction is required to provide appropriate egress from the pad and related areas in the event of an emergency and thereby address a long-term issue of safety non-compliance. At present, a person at SLC-2E or Building 1628 (Delta Building) would need to drive toward the launch pad to escape a release at the pad. The new road will allow for emergency evacuation in a direction away from the launch pad.

The additional parking lot and the new and modified office and warehouse space is needed to provide for the increased staffing that occurs at launches. At present, the parking lot at the Delta Building is filled to capacity most days. With the increased work force, especially during launches, parking is substantially inadequate. At the April 24, 1996 launch, MDA estimated that roughly 200 people visited SLC-2W, and parking was a problem. The proposed new 120-vehicle parking lot has been developed to provide adequate facilities for staff and visitors at the launch site.

The proposed new or modified buildings are required to accommodate the increased work force and increased amount of equipment required for the preparation and successful launch of up to 10 rockets annually. MDA uses a highly integrated work force, meaning that most technical personnel perform a mixture of technical and administrative functions. Because of this diversity of duties for most MDA staff at SLC-2W, all but a small number of administrative personnel may access the launch pad on a daily basis. Because of this requirement for regular, routine access to the pad and need for adjacent office space, MDA has determined that expansion of the facilities at SLC-2W is the most feasible option for accommodating the anticipated increased work force.

### **1.4 Other Permitting Requirements**

The proposed launch increase required that MDA obtain a Coastal Consistency Certification from the California Coastal Commission (CCC) for commercial Delta II launches. Such a certification is based on the information contained in this EA supplemented by a Coastal Consistency

Certification document as well as other information requested by the CCC. Certification was granted on June 12, 1996.

The proposal may also require formal consultation with the National Marine Fisheries Service (NMFS) and/or USFWS to resolve potential impacts to special-status species. Programmatic consultations are underway between USAF and USFWS for threatened/ endangered species and between USAF and NMFS for marine mammals, to encompass all foreseeable launch programs at VAFB including this project.

At the time of the publication of this EA, a technical document (ENSR 1996) supported by this EA has been submitted to the NMFS in support of a letter of authorization for incidental harassment of seals from this project. Final negotiation of conditions for the letter of authorization is expected to occur within the next few months.

In addition, informal consultation with USFWS has occurred and their requests for project modifications and data collection have been incorporated into this document. Informal consultation was conducted in cooperation with the CCC staff. Based on those discussions, MDA agreed to several conditions for limiting and monitoring launches. Among these conditions are:

- In any given year, no more than three launches will occur between April 15 and July 31.
- Status of nesting western snowy plovers and California least terns will be monitored before and after launches that occur between 1 March and 30 September, to determine if launches impact site use and/or reproductive success. The feasibility of remote video-monitoring of least terns and snowy plovers during daylight launches during the most critical time during the nesting season (between 15 April and 31 July) will also be investigated, and implemented if appropriate.
- After five launches have occurred between April 15 and July 31 when least terns and snowy plovers are present, the data will be reviewed with USFWS to assess potential impacts to least terns and snowy plovers.

At the time of the publication of this EA, formal consultation with USFWS had not been completed. Requests for concurrence on the monitoring activities for impacts to least terns and snowy plovers listed in the three bullets above have been discussed with USFWS; however, to date a formal response has not been received.

---

## 1.5 Supplementary Mitigation

While no significant environmental impacts from the increased Delta II launch rate have been identified, MDA will implement the following supplementary measures to ensure protection of environmental resources.

- A qualified botanist will conduct a preconstruction survey with the construction engineer to verify that no dune mint will be removed. If dune mint plants are identified during this survey, the final road alignment will be adjusted to avoid an impact.
- Two-tenths of an acre of disturbed potential dune mint habitat in adjacent areas will be rehabilitated. Rehabilitation will consist of removing ice plant and providing stabilization of the dunes if required. The rehabilitation will be completed in coordination and under the direction of the VAFB botanist.
- The footprint of the temporary use areas for construction of the parking lot and road will be kept to a minimum.
- The topsoil removed from the site will be stockpiled and returned to the unpaved area following construction.
- The parking lot and road will be contoured to minimize focused runoff, which could lead to localized erosion.
- During final design for the parking lot, erosion will be further minimized by installing erosion control devices if required. Examples of such facilities may include gravel-lined, blind sumps at low spots in the lot, or multiple drainage points.
- Archaeological monitoring by qualified archaeologists and Native Americans will occur during all ground-disturbing activities associated with this project.
- Soils excavated in low areas will be tested for trichloroethylene (TCE) contamination. If TCE-contaminated soils are encountered, contaminated soils excavated from the site will be temporarily retained in plastic-lined, roll-off bins for disposal offsite consistent with the VAFB Hazardous Materials Management Plan (HAZMAT) and Emergency Spill and Response Plan.
- If contaminated ground water is encountered during road construction, excavation will be halted and road construction will be modified to avoid exposure of ground water.

- MDA will avoid daylight launches during weekends whenever possible. Beach closures will be conspicuously posted well before launch dates.
- If a substantial rain event occurs prior to the routine time frame for disposal of ignition pulse suppression (IPS) water, water testing will be expedited and water disposed of before large amounts of rain accumulate.
- If the SLC-6 industrial water disposal facilities are sufficiently full so as to cause an overflow or a high probability of an overflow with the addition of IPS water to that facility, the IPS water will be retained in the SLC-2W retention basin until it can be properly disposed of.

## **2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES**

### **2.1 General Setting**

VAFB is located in northern Santa Barbara County, approximately 225 kilometers (km) (140 miles) northwest of Los Angeles, California. The cities of Santa Maria and Lompoc are located within 16 km (10 miles) of the base and the city of Santa Barbara is roughly 80 km (50 miles) south. State Highway 246 (West Ocean Avenue) divides VAFB into north and south VAFB. Peacekeeper and Minuteman launch sites, the Delta launch site (SLC-2W), the airfield, the cantonment area (office buildings and military housing), and other activities are located on north VAFB. The Atlas (SLC-3), Titan (SLC-4), SLC-5 (currently inactive), and Lockheed (SLC-6) launch complexes are located on south VAFB. Figure 1-2 is a map of VAFB.

With 390 square km (153 square miles) of area, including 55 km (35 miles) of Pacific Ocean shoreline, VAFB is the largest remaining area of relatively undisturbed central California coast habitat. Less than 15 percent of the base land area is disturbed. The remaining area is in its natural state and provides habitat for a diverse array of wildlife and vegetation.

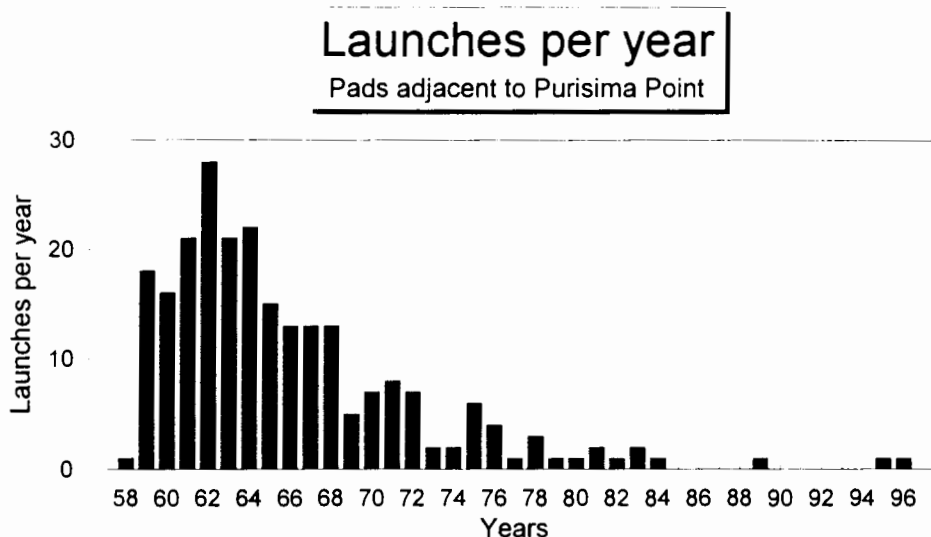
The northern Channel Islands, a unique biological resource, are located approximately 65 km (40 miles) south-southeast of VAFB. Space vehicles are launched from VAFB in a general southerly direction. Because the exact trajectory is established by mission and safety requirements, some vehicle trajectories may pass near the northern Channel Islands.

### **2.2 Historical Overview of Activities at SLC-2W**

Camp Cooke Army Post occupied the present site of VAFB until April 1957. SLC-2W, located near Purisima Point, was constructed in 1958. According to an April 1953 map of the area near Purisima Point, the area contained a number of weapons training areas. Documents and physical evidence indicate that extensive armored weapons firing and troop training occurred over the entire SLC-2W site.

Since the inception of VAFB as a launch site, there have been a total of 294 THOR and Delta launches from pads near Purisima Point. The maximum annual launch rate was 28 in 1962, and the average annual launch rate between 1959 and 1968 was approximately 15 (Figure 2-1). SLC-2W is one of six launch pads built in approximately 1958 for training Air Force personnel for launching THOR rockets. SLC-2W was subsequently modified to launch THOR Agena, THOR Delta, and Delta I launch vehicles. A total of 24 THOR missiles and 26 Delta rockets have been launched from SLC-2W.





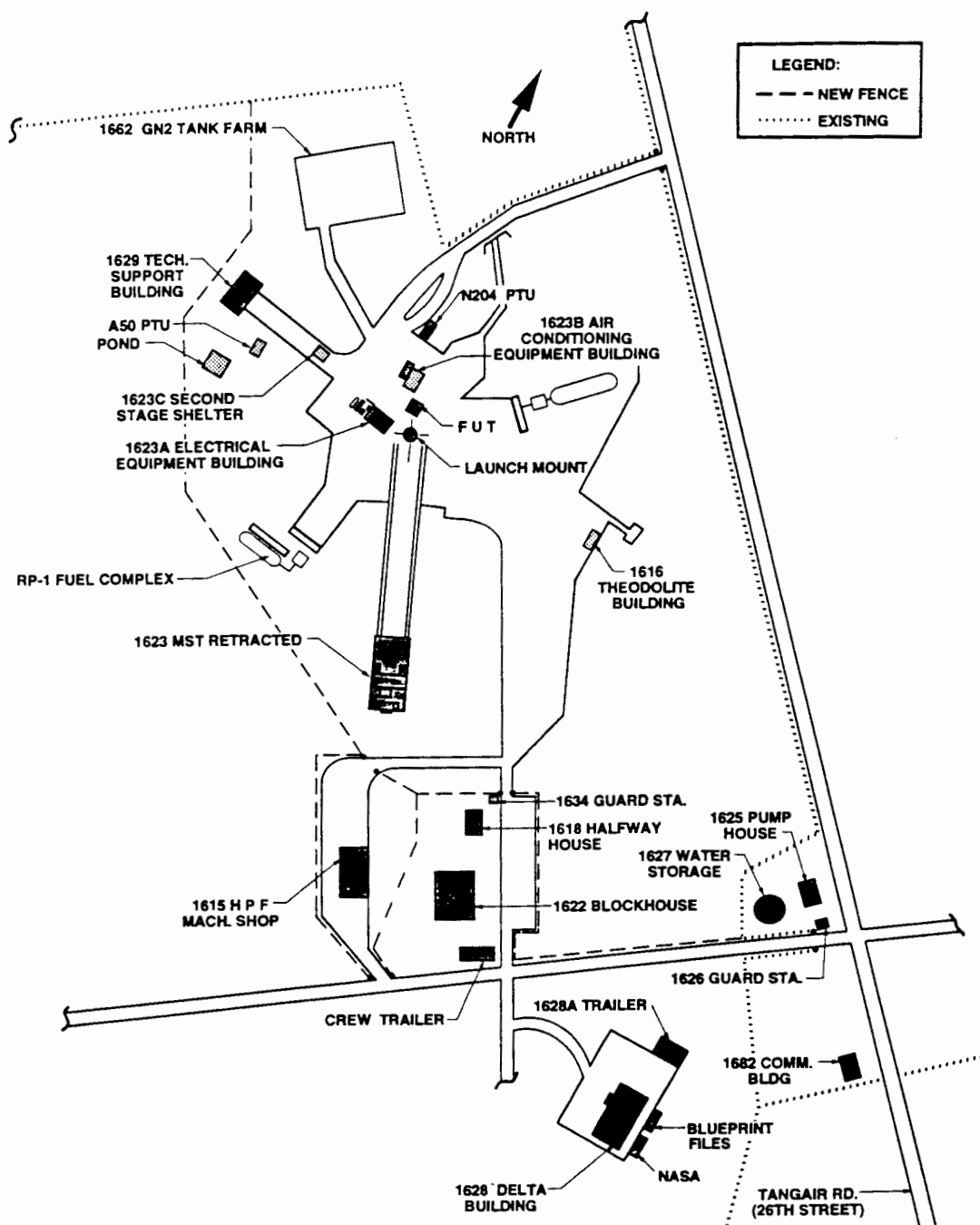
**FIGURE 2-1. Historic Launch Rates for Facilities Near Purisima Point**

The SLC-2W launch facility is inside a fenced area providing a controlled access work place for both flight hardware processing and launch activities. In 1992, it was reconfigured to launch a standard Delta II launch vehicle. SLC-2W consists of a launch pad and various structures that support launch operations including a mobile service tower, fixed umbilical tower, blockhouse, horizontal processing facility, solid rocket motor facility, and facilities for vehicle assembly, fueling, preflight checkout, and launch (Figure 2-2).

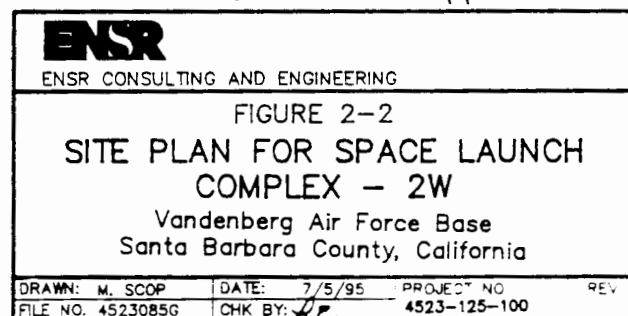
### 2.3 Proposed Action

MDA is proposing to increase its launch rate of Delta II launch vehicles with associated DoD, NASA, and commercial payloads from SLC-2W from the current permitted level of two per year to a maximum of 10 per year. In addition, two access roads will be constructed and several trailers will be replaced by new buildings to address safety issues and base-wide architectural issues, respectively.

The Air Force has completed the environmental review under NEPA for up to two launches annually from SLC-2W of Delta II rockets. The launches can occur year round with only minor considerations on the timing of the launches (see Section 1.2). The main focus of the proposed action covered by this EA is the addition of eight Delta II launches from SLC-2W, without major restrictions on the timing of the launches. Up to five of these launches could occur within the breeding season of the adjacent least tern and snowy plover populations.



(NOT TO SCALE)



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### **2.3.1 Features of Launches**

The following sections provide a description of the Delta II launch vehicle, activities required to prepare for and complete a launch, and the flight characteristics during a launch. In addition, the Delta II is compared to other rockets launched from VAFB.

#### **2.3.1.1 Overview of Delta II Launch Vehicle**

The three-stage Delta II is 37.6 meters (123.5 feet) high and weighs approximately 232,759 kilograms (Kg) (513,000 pounds) when fully fueled (Figure 2-3). The Delta II consists of four or five major assemblies: first stage, interstage, second stage, third stage (if appropriate to the mission), and payload fairing (Figure 2-4).

##### First Stage

The first stage is composed of the liquid rocket propellant (RP)-1 fuel tank, liquid oxygen (LOX) tank, center body section, and main engine. The fuel tank accommodates about 38,000 liters (9,950 gallons, 30,250 Kg, or 66,685 pounds) of RP-1 (a high-grade kerosene), and the oxidizer tank accommodates approximately 60,000 liters (16,140 gallons, 66,250 Kg, or 146,070 pounds) of LOX. These fuels are combined in the main engine. Together, first stage and interstage are about 30.8 meters (101 feet) in length and 2.4 meters (8 feet) in diameter.

##### First Stage - Solid Rocket Motors

The Delta II is equipped with nine small solid rocket motors (SRMs), mated to the base of the first stage, which provide additional energy during liftoff. The SRMs with which the Delta II is augmented are Graphite Epoxy Motors (GEMs). Each GEM contains approximately 11,706 Kg (25,800 pounds) of propellant<sup>1</sup> and weighs a total of about 12,976 Kg (28,600 pounds). The GEMs are each approximately 13.0 meters (42.5 feet) long and 1.0 meter (3.3 feet) in diameter.

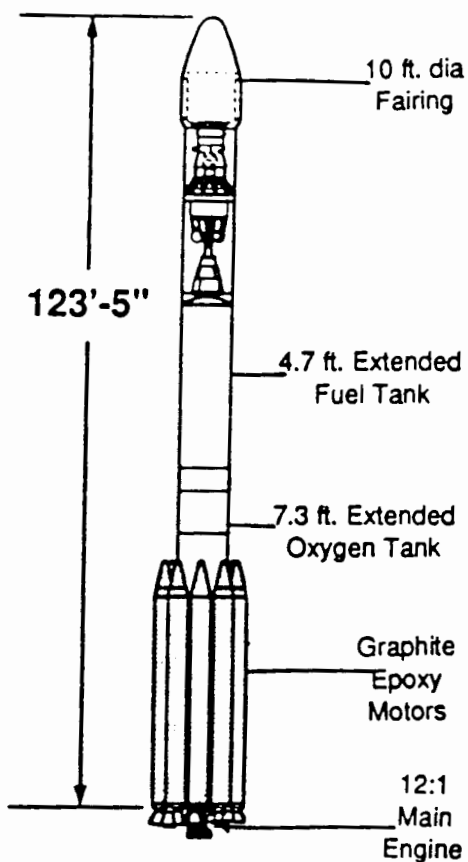
##### Interstage

The 4.7 meter (15.5 foot) long, 2.4 meter (8 foot) diameter interstage extends from the top of the first stage to the second stage miniskirt and bears loads from the second stage, third stage, and fairing to the first stage. It contains fairing exhaust vents and separation rods/springs.

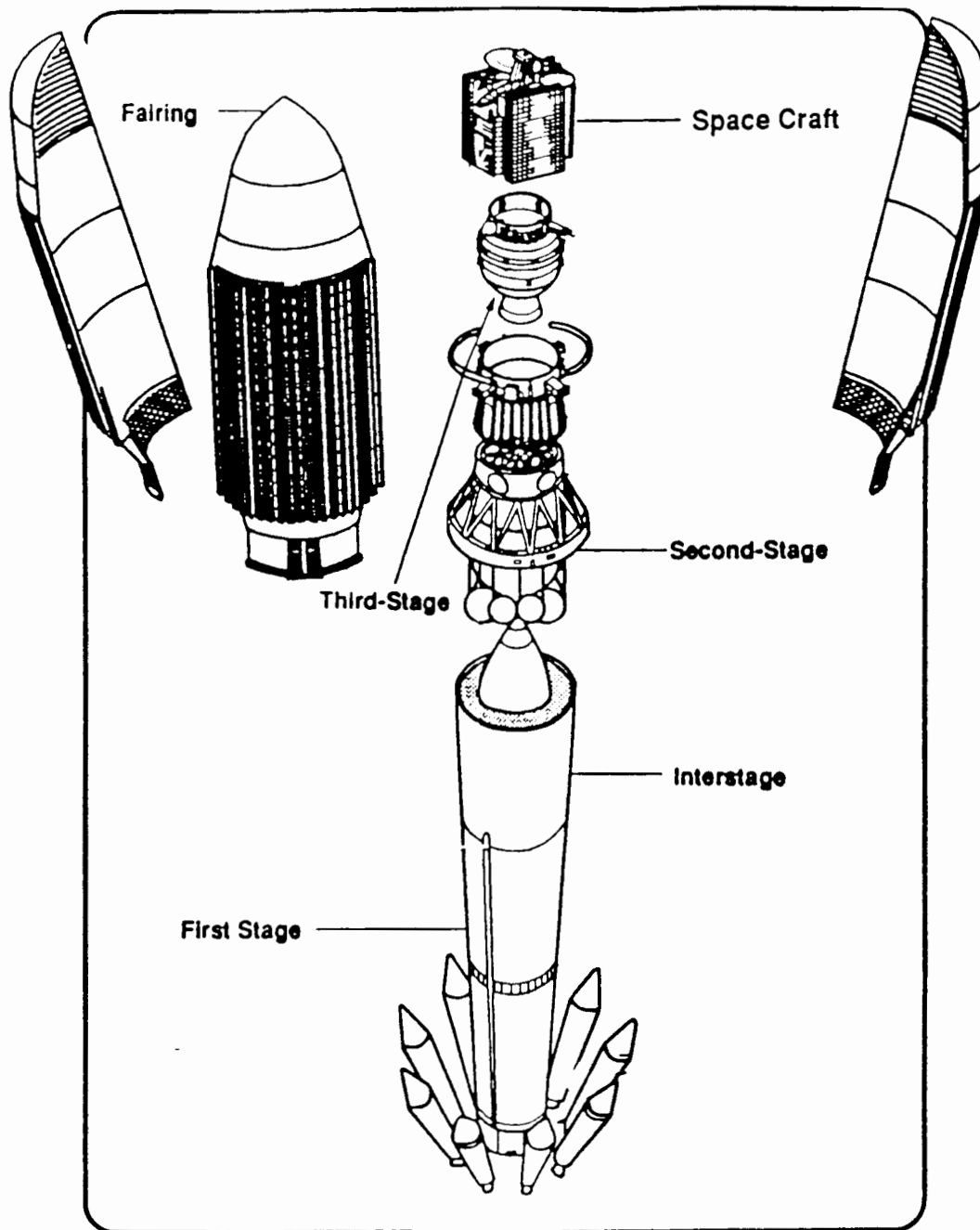
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<sup>1</sup> The GEM propellant is a hard rubbery material not unlike car tires in texture. It contains a number of additives that are hazardous when in a free, unbound state. In the GEM, they are an integral part of the cast motor and are unavailable for exposure to the environment.

# Delta II



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FIGURE 2-3			
<b>DELTA LAUNCH VEHICLE CONFIGURATION</b>			
Vandenberg Air Force Base Santa Barbara County, California			
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**FIGURE 2-4  
DELTA II MAJOR ASSEMBLIES**

Vandenberg Air Force Base  
Santa Barbara County, California

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FILE NO. 4523085G	CHK BY: <i>KE</i>	4523-125-100	

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## Second and Third Stages

The second stage contains an Aerojet pressure-fed engine, using Aerozine-50<sup>2</sup> (A-50) as the fuel and nitrogen tetroxide (N<sub>2</sub>O<sub>4</sub>) as the oxidizer. It has a nitrogen gas redundant attitude control system for pitch and yaw control during powered flight and a Redundant Inertial Flight Control Assembly to control the vehicle during first- and second-stage flight. The second stage is about 7 meters (22.9 feet) long and 1.7 meters (5.7 feet) in diameter.

The third stage, utilized if a mission orbit parameter requires, consists of a payload attach fitting, a Thiokol Star-48 solid rocket motor, and a spin table. The payload attach fitting provides the structural interface between the spacecraft and the SRM that provides the boost for final injection into transfer orbit. The upper stage also includes an ordnance sequencing system for event timing, a spacecraft separation system, and a telemetry system.

## Payload Fairing

The Delta II can accommodate a payload fairing diameter of either 2.4 meters (8 feet), 2.9 meters (9.5 feet), or 3.0 meters (10 feet), depending on spacecraft requirements. The 2.4 meter (8 foot) and 2.9 meter (9.5 foot) fairings separate into two pieces and the 3 meter (10 foot) fairing separates into either two or three pieces, depending upon final design of the payload. The fairings separate on command from the second-stage guidance system using a contamination-free separation joint. An acoustical blanket system inside the fairing provides environmental protection for the spacecraft during vehicle ascent.

### **2.3.1.2 Flight Preparations and Prelaunch/Post-launch Activities**

To prepare for the flight of a rocket, its component parts are received at SLC-2W and final assembly is completed. No new parts are manufactured onsite for a launch. The main motor and second stage, and if required, third stage, are manufactured in Colorado, shipped by diesel truck to Florida for initial assembly, and then shipped by diesel truck to SLC-2W for final assembly. The SRMs are manufactured in Utah and shipped via diesel truck directly to SLC-2W. The interstage and fairing are also manufactured in Colorado and shipped directly to SLC-2W.

Final assembly requires the use of solvents for cleaning electrical contacts and bonding surfaces, adhesives for joining and securing equipment and covers, and paints and other surface coatings to protect specialized parts. These materials are listed in Table 2-1. Because the component

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<sup>2</sup> Aerozine-50 and N<sub>2</sub>O<sub>4</sub> are hypergolic fuels that will spontaneously ignite when mixed. Both are acutely hazardous.

TABLE 2-1

Summary of Hazardous Materials and Chemicals for Delta II Vehicle

Description	VOC <sup>a</sup> g/L <sup>b</sup>	Typical Amount Used <sup>c</sup> per Launch <sup>d,e</sup>	
Solvent (Naphtha)	970	0.25 gal.	1.1 liter
Toluene	867	0.5 gal.	2 liters
Solvent (1,1,1-trichloroethane)	— <sup>f</sup>	64 fl. oz.	2 liters
Primer	337	64 fl. oz.	2 liters
Thread primer	068	3.5 fl. oz.	100 ml
Primer	741	25 fl. oz.	750 ml
Primer	090	2 fl. oz.	60 ml
Primer	741	1.12 gal.	4 liters
Primer	340	16 fl. oz.	500 ml
Coating	547	2 fl. oz.	60 ml
Coating	640	32 fl. oz.	100 ml
Coating	N/A	4 fl. oz.	120 ml
Coating	256	4 gal.	15 liters
Rustoleum black coating	N/A	16 fl. oz.	500 ml
Black ink	713	8 fl. oz.	250 ml
Red ink	265	13 wt. oz.	350 grams
Red ink	405	30 grams	
Black ink	405	200 grams	
White ink	405	30 grams	
<p>N/A = Not available  ml = milliliter  a VOC = Volatile organic compounds.  b g/L = Grams per liter.  c A small to large portion of many of the solvents is recovered or retained in wipe rags for disposal. The amount used is a conservative maximum amount that could be volatilized.  d On a typical annual basis, the following additional chemicals are expected to be used: 110 liters (30 gallons) isopropanol, 31 liters (8.25 gallons) methyl ethyl ketone, and 55 liters (15 gallons) of freon-113.  e TCE has also been used as needed on an annual basis, but is being phased out and replaced with hot gaseous nitrogen. The chemical usage is covered under air quality permit number 8914 (see Table 3-2).  f 1,1,1-trichloroethane is not photochemically reactive.</p>			
Source: MDA			

parts are manufactured offsite and arrive nearly ready for launch, the quantities of material used for assembling the parts are minimal. However, any hazardous waste generated will be processed in accordance with the VAFB-approved HAZMAT (see Section 3.5).

Once a rocket is fully assembled with its payload in place, final preparation for flight begins. This preparation requires the loading of fuel and oxidizer and the rechecking of systems for proper operation. Once the rocket is fully operational and the appropriate launch time has arrived, the rocket is launched. At liftoff, the main engine and six of the SRMs are started. Just before the engines and SRMs are ignited, IPS water is sprayed from a ring below the main engine into the flame duct. IPS water flows for only 3 to 4 minutes and is used to minimize the back pressure from the initial ignition of the main engine. IPS water is collected in a basin at the bottom of the flame trough adjacent to the launch pad for disposal as industrial wastewater (See Section 4.2.2.2 and Appendix D).

Following the launch, the pad is washed down and the water is captured in the basin associated with the flame trough. The water in the basin is tested for contaminants and then disposed of in the VAFB wastewater facilities at SLC-6 as industrial wastewater.

In the event that a mission is stopped after the fuel and oxidizer have been loaded, these materials can be removed and replaced into their original storage vessels.

### **2.3.1.3 Flight Characteristics**

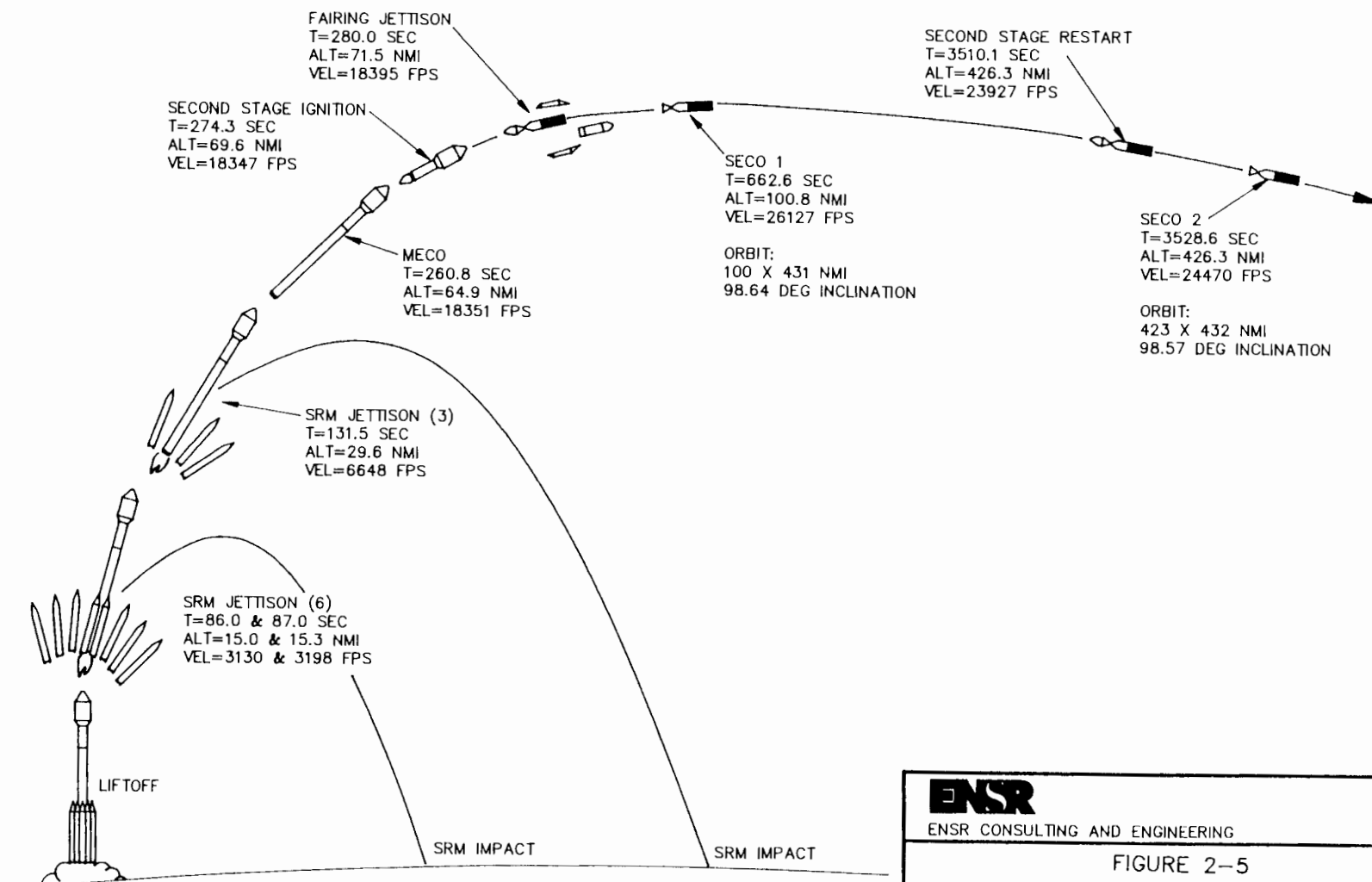
A typical mission using a two-stage booster proceeds in roughly the following order (Table 2-2). At liftoff from the launch pad, the Delta II first-stage propellant engine and six of the GEM SRMs are ignited. The six GEMs burn out at approximately 64 seconds and the remaining three GEMs are ignited at approximately 66 seconds, by which time the vehicle has achieved an altitude of approximately 14 km (10 nautical miles (nmi)) and is 10 to 11 km (7 to 8 nmi) down range. At approximately 86 seconds at an altitude of approximately 21 km (15 nmi), the six spent SRMs are jettisoned in two sets of three separated by approximately one second. The remaining three SRMs burn out at approximately 130 seconds and are subsequently jettisoned.

The Delta II continues to be powered by the first stage until main engine cut-off (MECO) at approximately 260 seconds, followed by vernier engine cut-off (VECO) at approximately 267 seconds, and first- and second-stage separation at 273 seconds. The fairing is jettisoned at 280 seconds, and, depending on the mission, the multiple second-stage starts/cutoffs may take place. The vehicle then coasts until approximately 3,500 seconds when the second-stage engine is ignited in space for about a 20-second burn. The vehicle is stabilized and the spacecraft separated. Figure 2-5 depicts the activities during specified periods in the launch sequence.



**Table 2-2**  
**Sample Delta II Polar Orbit Mission from Western Range**  
**Launch Sequence of Events**

Time (T) in Seconds	Events
T-000.9	LOX/RP-1 Engine Bootstraps
T-000.3	Ignition of six ground start solid motors
T+000.0	Liftoff
T+016.9	900 meters (3,000 feet) altitude
T+059.3	15 kilometers (49,213 feet) altitude
T+064.0	Burnout of six ground start solid motors
T+065.5	Ignition of three air start solid motors
T+086.0	Jettison three solid motors, first set
T+087.0	Jettison three solid motors, second set
T+129.7	Burnout of three air start solid motors
T+131.5	Jettison three solid motors, air start set
T+140.0	60 km (196,850 feet) altitude
T+260.8	MECO
T+266.8	VECO
T+274.3	N <sub>2</sub> O <sub>4</sub> / A-50 engine ignition - first burn - 70 nmi
T+280.0	Fairing jettisoned
T+662.0	N <sub>2</sub> O <sub>4</sub> / A-50 engine cutoff - 100 nmi
T+3510.0	N <sub>2</sub> O <sub>4</sub> / A-50 engine ignition - second burn - 426 nmi
T+3528.0	N <sub>2</sub> O <sub>4</sub> / A-50 engine cutoff
T+3750.0	Space craft separation
T+4664.0	N <sub>2</sub> O <sub>4</sub> / A-50 engine ignition - evasive maneuver - 430 nmi
T+4670.0	N <sub>2</sub> O <sub>4</sub> / A-50 engine cutoff
T+6295.0	N <sub>2</sub> O <sub>4</sub> / A-50 engine ignition - depletion burn - 621 nmi
T+6313.0	N <sub>2</sub> O <sub>4</sub> / A-50 engine shutdown at propellant depletion
<b>Source: MDA</b>	

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FIGURE 2-5

### TYPICAL MISSION PROFILE USING TWO-STAGE BOOSTER

Vandenberg Air Force Base  
Santa Barbara County, California

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FILE NO. 4523085	CHK BY: <i>JE</i>	4523-125-100	

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Because SLC-2W is located north of most other launch complexes at VAFB and because there are oil production platforms located off the coast to the south of SLC-2W, missions flown from SLC-2W cannot fly directly on their final southward course. The normal trajectory for a SLC-2W launch is nominally 259.5 degrees west for the first 90 seconds then a 41-second dog-leg maneuver to bring the vehicle on its southward course of 196 degrees. It should be noted that until the rocket is several kilometers off the ground, its flight is primarily straight up in the air. This trajectory takes the rocket nearly 50 km (30 miles) west of San Miguel Island, the westernmost Channel Island (Figure 2-6).

#### **2.3.1.4 Comparison of Rockets At VAFB**

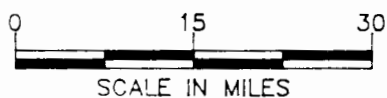
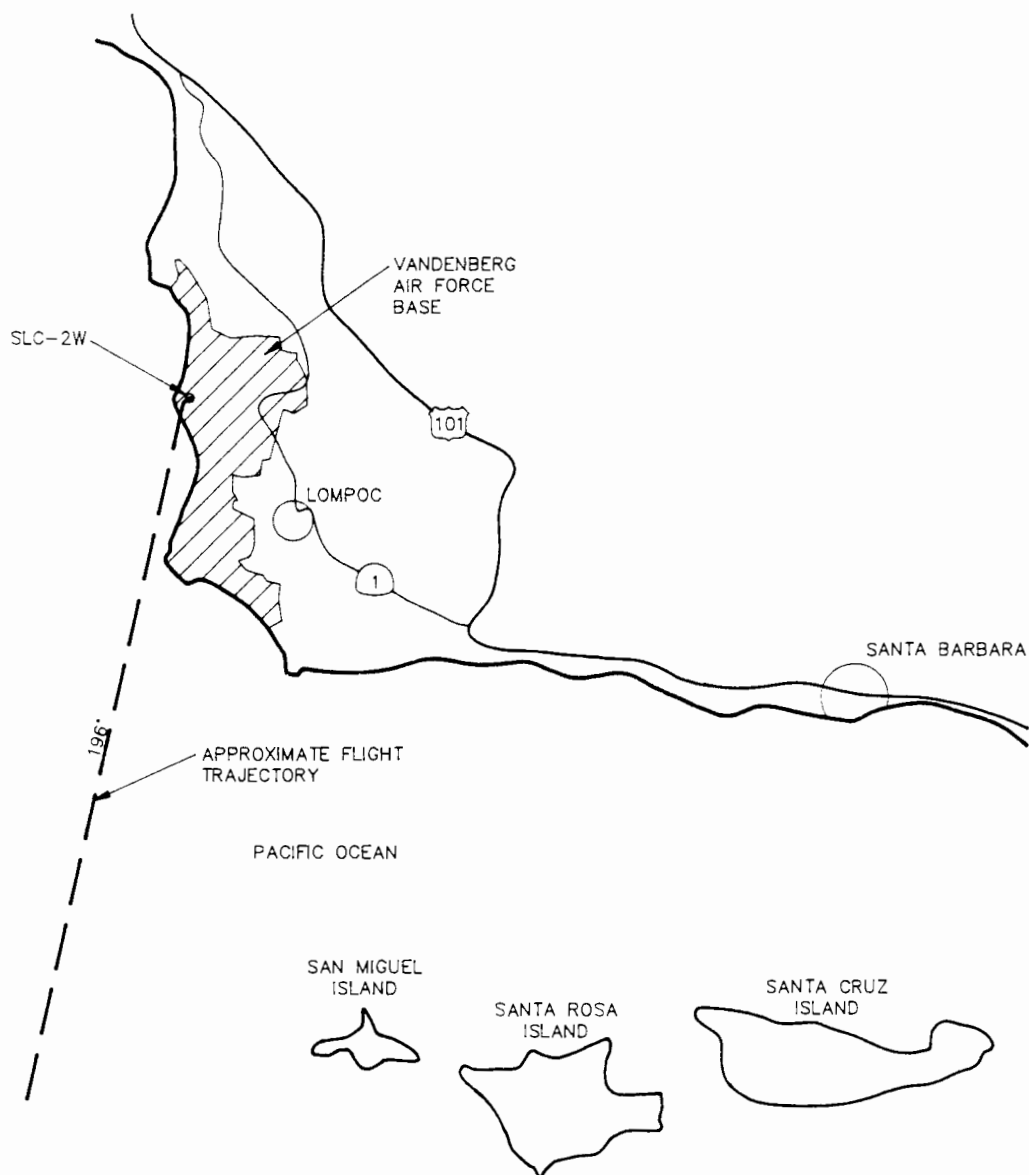
Figure 2-7 presents a comparison of the Delta II and other rockets formerly proposed for or currently operating from VAFB. The largest expendable rocket, the Titan IV, is approximately 62 meters (204 feet) high and weighs approximately 860,000 Kg (1,900,000 pounds). It has the capacity to launch roughly four times the payload of the Delta II. By comparison, the Space Shuttle<sup>3</sup> is about the same height as the Titan IV but weighs nearly 10 times as much as the Delta and can launch roughly 10 times the payload of Delta II. Noise generated by both the Titan and the Space Shuttle are far greater than that generated by the Delta II and are relatively similar in proportion to their payload capacity. For example, the Space Shuttle would produce roughly 10 times as much sound energy as the Delta II. The Lockheed Launch Vehicle (LLV) in its largest configuration (LLV-3) is comparable in size to but slightly smaller than the Delta II. It has flown from SLC-6 on VAFB, and has received essentially the same permits for flights as required for Delta II. The Taurus is smaller than the Delta II and will be flown from VAFB at a site roughly 1-½ km (1 mile) south of SLC-2W.

#### **2.3.2 Facilities Modifications**

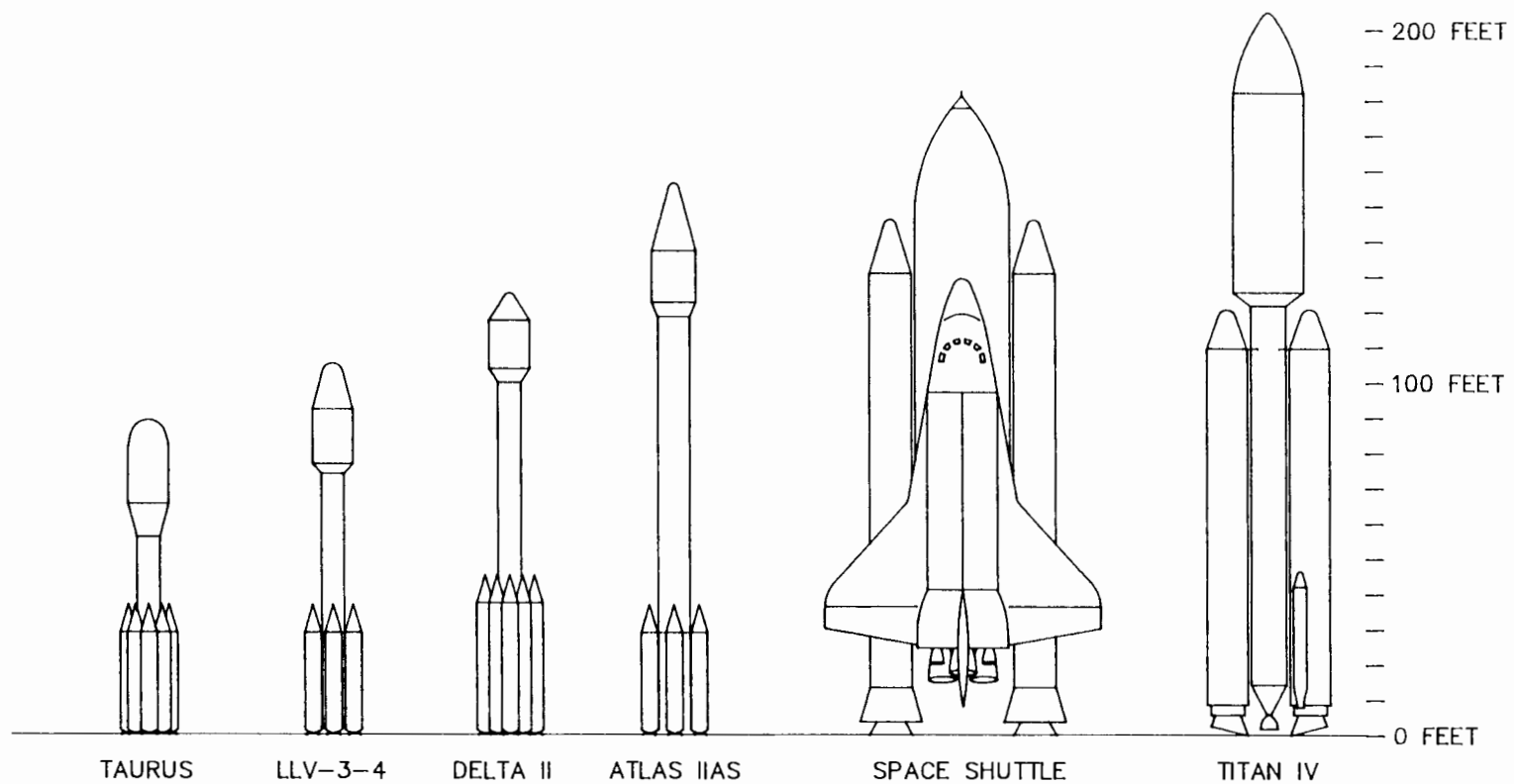
To address safety concerns during all launches and related activities at SLC-2W, a new access road to Building 1628 and SLC-2E will be constructed (Figure 2-8). The road will be uncurbed and roughly 6.1 meters (20 feet) wide and 550 meters (1,800 feet) long. The northern terminus will be at Tangair Road roughly 90 meters (300 feet) west of Spur Road. Its southern terminus will be at the northwestern corner of SLC-2E. The road will join the parking lot near the northeastern corner of SLC-2E. A new guard station will be built at the fenceline to the SLC-2 compound and a new parking lot will be constructed roughly 60 meters (200 feet) past the guard station and east of Building 1628. The parking lot will be approximately 60 meters (200 feet) by 90 meters (300 feet) and will hold up to 120 cars. A second access road roughly 120 meters

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<sup>3</sup> While the space shuttle was never flown from VAFB, many studies have been prepared to consider impacts resulting from such a launch vehicle.



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FIGURE 2-6			
DELTA II			
APPROXIMATE FLIGHT TRAJECTORY			
Vandenberg Air Force Base Santa Barbara County, California			
DRAWN: M. SCOP	DATE: 10/2/95	PROJECT NO.	REV.
FILE NO. 4523085f	CHK BY: <i>pe</i>	4523-125-100	

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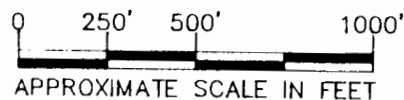
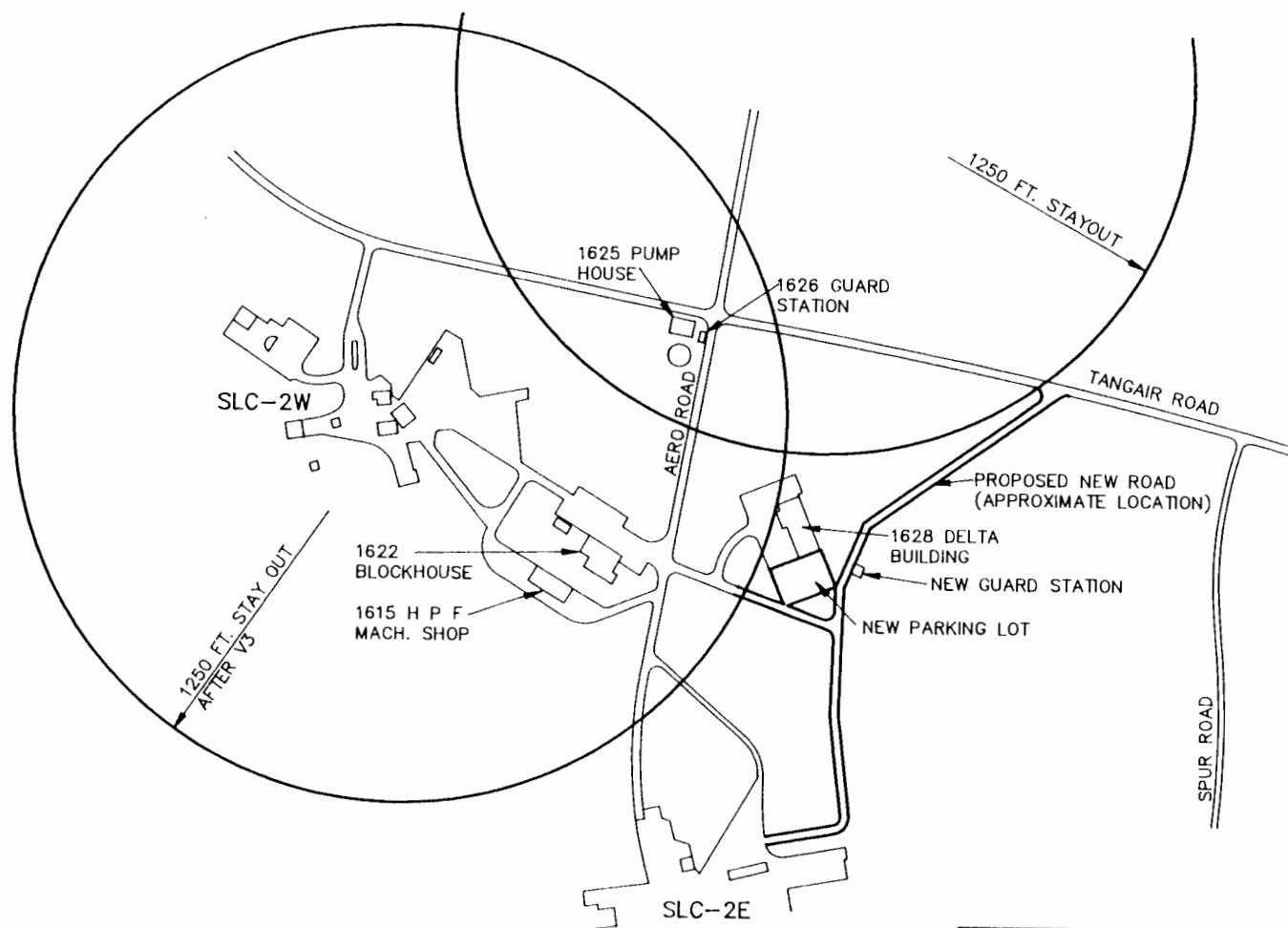
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FIGURE 2-7  
**COMPARISON OF LAUNCH VEHICLES**

Vandenberg Air Force Base  
 Santa Barbara County, California

DRAWN: M. SCOP	DATE: 6/23/95	PROJECT NO. 4523-125-100	REV.
FILE NO. 4523085D	CHK BY: <i>RE</i>		

**ENSR**



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FIGURE 2-8 <b>PROPOSED ROAD</b>			
Vandenberg Air Force Base Santa Barbara County, California			
DRAWN: M. SCOP	DATE: 1/31/96	PROJECT NO.	REV.
FILE NO. 4523125a	CHK BY: <i>JP</i>	4523-125-100	

(400 feet) long will join the opposite side of the parking lot and the new road to the existing road leading to Building 1628. The new roads and the parking lot will be asphalt-paved. Construction of the new roads and the parking lot will require roughly 20 days of activity.

The selection of the road alignment has been on several criteria including avoidance of the Quantity Distance (QD) circle (safety area around the launch pad), avoidance of dune mint populations, minimization of erosion through minimized elevation changes, and preference for areas already disturbed. Other alignments had been suggested, the most reasonable of which were from either the Delta Building (Building 1628) or SLC-2E almost due east to Spur Road. These two routings were not selected because they make emergency egress more difficult through the presence of 90 degree turns at Spur Road and Tangair Road, yet they provide no difference in environmental impacts. Potential impacts from road construction are expected to be insignificant for all potential siting locations and are discussed in Section 4.0. Final detailed siting of the roadway will be affected by site-specific factors that may become apparent at construction. Mitigation measures to ensure that no impacts occur to resources irrespective of the final detailed siting have also been presented in Section 4.0. Because there are no differences in impacts from the final siting of the roadway, different potential final alignments have not been considered as alternatives for this project and are not considered further in this EA.

Up to four new or modified buildings will be constructed at SLC-2W. The construction of these buildings will result in the addition of 370 square meters (4,000 square feet) of warehouse space, 200 square meters (2,160 square feet) of conference space, 390 square meters (4,200 square feet) of office space, and 200 square meters (2,160 square feet) of a break room/briefing room. Concurrent with new building construction, the Alignment Room (Building 1618) will be modified and facilities that are not required to be within the QD circle will be relocated outside this area. Removal of the existing trailers and construction of pads for the new buildings will require roughly 20 days of activity at the site.

The use of existing facilities elsewhere on VAFB was evaluated but judged impractical given the integrated work requirements of most MDA employees who work at SLC-2W. Accommodations for allowing workers regular access to the launch site and their offices from other VAFB facilities were expected to result in a reduction in work efficiency, an increase in vehicular traffic, a further increase in work force, and a substantial impediment to the achievement of the project. Based on these factors, construction at the launch site was determined to be the only viable option and is the only option evaluated in the rest of the document.

Construction of either new, modular buildings or expansion of existing buildings is expected to yield no differences in environmental impacts because the facilities would all be placed on existing paved or disturbed areas. At present, MDA proposes to construct modular buildings,

and has requested a waiver for such. "Per HQ of the Secretary of the Air Force/MII direction, the use of modular buildings is discouraged on military properties." (30 CES/CECB 1996) MDA has filed a request of a waiver of this limitation on use of modular buildings. In the event that the waiver is not granted, MDA will modify the existing structures to achieve the required increase in floor space. Because both options would yield similar environmental impacts and these impacts have been evaluated in Section 4.0, a separate analysis for each option has not been included herein.

Major equipment to be used during construction activities at the site is listed in Table 2-3. Road and parking lot construction will follow standard methodologies for asphalt road construction with clearing of the right-of-way, preparation of the soil base, laying down of the pavement base material, and final paving of the roadway (and parking lot). Standard cut and fill procedures to produce a flat roadbed will be used. Low areas will be filled with material from high areas. It is anticipated that no new soils will be required as road base. Also, it is expected that excavation of soils will not exceed four to five feet in depth, and will likely be much less in low areas. Prior to the initiation of construction activities, a preconstruction survey of the area will be conducted by the VAFB explosive ordnance detail (EOD) for the presence of potential unexploded ordnance.

Runoff of stormwater from the road during construction and operation will be to the sides of the paved area. Directed runoff of stormwater from the parking lot will be minimized by maintaining only a gentle slope on the pavement. Whether or not a runoff collection system will need to be incorporated into the final design will be determined after contours and slope of the lot have been designed. In the event that such a system would be appropriate, types of facilities which might be included may be one or more small blind concrete sumps lined with gravel at the low spot of the lot, multiple gradual sloping contours to divert runoff to several locations, or other facilities consistent with the magnitude of the runoff.

## **2.4 Alternatives to Proposed Action**

Alternatives to the proposed action include:

- Launch from alternate existing Delta site
- Launch from a new site
- Different number of launches
- No action



**TABLE 2-3**

**Equipment to be Used for Renovation and  
Construction of Facilities and Roads**

<b>Equipment Description</b>	<b>Number</b>	<b>Total Power (horsepower)</b>	<b>Engine Load (percent)<sup>a</sup></b>	<b>Time (hours/day)</b>	<b>Operating Duration (days/year)</b>
Truck, dump(g)	3	150	80	8	20
Truck, asphalt(g)	3	150	80	8	10
Asphalt paver(d)	1	175	80	8	10
Crawler tractor(d)	2	200	80	8	20
Grader(d)	1	200	80	8	20
Loader(d)	1	200	80	8	20
Truck, ½ ton(g)	1	120 to 200	80	8	20
Generator/compressor(g)	1	120	80	8	5
truck, concrete(d)	2	300	80	8	5
Truck, water(g)	1	200	80	8	20
<b>a = percent of total engine power used on average</b> <b>g = Gasoline</b> <b>d = Diesel</b>  <b>Source: MDA</b>					

In general, all alternatives would fail to meet Delta II mission schedule requirements by 2 or more years and at higher initial cost. At present, no existing alternative Delta II sites can readily achieve the required flight profiles and no other launch facilities are capable of launching Delta II rockets. Based on the SLC-7 EIS, building a new site would involve greater environmental impacts during construction due to new surface disturbances and, depending upon the new location, may or may not have the potential for reduced environmental impacts during operation.

The "no action" alternative would reduce the near-term capacity for achieving the nation's policy of access to space for commercial customers by forcing such customers to obtain launch services from sources such as foreign interests. This alternative would also inhibit capabilities for DoD and NASA missions.

Each of the project alternatives is discussed in more detail in Sections 2.4.1 through 2.4.4. Because all three of the project alternatives fail to meet the project objectives, the analysis of environmental impacts from these alternatives is not considered further in the EA. Potential environmental impacts are considered only for the no project alternatives.

#### **2.4.1 Launch from Alternate Existing Delta Site**

Aside from SLC-17 at CCAS, no other launch site is presently configured to accommodate a Delta II launch vehicle. SLC-2W is the only launch site at VAFB that is suitable for launching Delta II vehicles to deliver payloads into polar orbits. Launches from SLC-17 and other CCAS space centers are constrained to easterly launch azimuths between 35 and 120 degrees to avoid flying over populated areas. To achieve a polar orbit from a CCAS launch would require in-flight changes, thus increasing the amount of fuel burned, decreasing payload capability, and increasing potential safety hazards.

#### **2.4.2 Launch from a New Site or Existing Non-Delta Site**

No other existing launch facility at VAFB currently has the capability to conduct Delta II launch operations. Existing unused facilities such as SLC-6, SLC-5, and SLC-3W would require extensive modifications to establish the Delta II capabilities required for this project. Efforts to modify these existing facilities, including permitting, engineering design, and construction, would require sufficient time to preclude their use for the current project, which begins in late 1996. The one new facility planned for VAFB, specifically the California Spaceport under construction on South VAFB, is not currently capable of supporting Delta II launches. Modifications to this facility's site design to incorporate Delta II capabilities are being considered, but the schedule to complete the design, permitting, construction, and contracting actions would also extend beyond the time requirements of this project. Therefore, Delta II launches from these other VAFB sites are not considered reasonable alternatives to using SLC-2W at this time.

#### **2.4.3 Different Number of Launches**

Based on historic usage and current and anticipated mission constraints for processing time and other logistical constraints, the maximum capability of Delta II launches at SLC-2W is limited to 10 per year. Present manifest plans call for no more than seven launches per year. However, with continuing interest in the use of satellites for communications, environmental analysis, celestial exploration, and other purposes, MDA anticipates a growing need for Delta II launch services during the next few years. To provide for a complete analysis of the maximum potential impact from Delta II launches at SLC-2W, MDA is proposing the present project. Providing for

fewer launches would not allow MDA to meet the increasing demands for access to space should the demand continue to increase as expected.

#### **2.4.4 No Action**

The Delta launch vehicle is classed as a medium expendable launch vehicle. Presently, three other vehicles at VAFB, the Atlas, the Titan II, and the LLV-3, have similar payload capacity. Since the 1986 Challenger incident, the USAF and NASA have implemented a mixed fleet approach to ensure access to space for both government and commercial customers. Reduction of launch vehicle capability would result in degradation of government, civilian, and commercial research capabilities in space and could have adverse impacts to the United States economy with the growth of foreign launch vehicle capabilities. In addition, MDA would be placed at a significant competitive disadvantage relative to other commercial launch operators at VAFB.

The no-action alternative was evaluated and determined not to be a viable option. Same level use of existing facilities neither supports the requirements for timely launch of commercial satellites nor provides an alternative capability necessary for assured access to space for all potential users.

## **3.0 AFFECTED ENVIRONMENT**

### **3.1 Air Quality**

#### **3.1.1 Climatology and Meteorology**

The climate of Santa Barbara County is typical of coastal south-central California and is categorized as Mediterranean, or dry subtropical. Year-round mild temperatures moving through gradual transitions characterize the climate more than do clearly defined seasons.

The average annual temperature at VAFB is 57 degrees Fahrenheit (°F) (based on data for a period between 1975-1984). Air temperatures are moderate throughout the year; the highest mean monthly temperature is 62°F (September) and the lowest mean monthly temperature is 52°F (January and February). The highest and lowest temperatures ever recorded at VAFB are 100°F and 25°F, respectively (USAF 1985).

The persistence of the Pacific high pressure air mass over the California south-central coast region during the late spring, summer, and fall results in a general onshore, or northwesterly, flow. This wind direction may be modified slightly by sea breezes during the day; weak land breezes, flowing off-shore, may develop at night.

Wind speed and wind direction have been measured at SLC-2 (VAFB Tower 102) for more than 15 years. Data collected at the 3.7 meter (12-foot) level indicate the prevailing winds are predominantly northwest with an annual average wind speed at SLC-2W of approximately 13.5 km per hour (8.4 miles per hour (mph)). Wind speed generally increases during the day, peaking in the afternoon. During the fall and early winter (and occasionally during late spring and early summer), Santa Ana winds occur intermittently, causing hot, dry conditions in the region. These strong, gusty winds blow from the Nevada plateau through the mountain valleys and out to the ocean.

There is a significant shift in the prevailing wind direction along the coast, between northern Santa Barbara County and southern Santa Barbara County (divided by the Santa Ynez mountains). For northern Santa Barbara County, prevailing wind direction is northwest, while for southern Santa Barbara County, the prevailing wind direction is west-southwest.

Rainfall in the vicinity of VAFB averages about 36 centimeters (cm) (14 inches) annually, with a marked seasonal variation. The majority of the rainfall occurs in the winter. January is typically

the wettest month, July the driest. An average of 1.8 cm (0.7 inch) of precipitation falls from May through September with an average of 33.8 cm (13.3 inches) of precipitation from October through April. Trace amounts of snowfall have been recorded in December and January; however, snow is very rare (USAF 1985).

### **3.1.2 Description of Local Air Quality**

VAFB is located within the California South Central Coast Air Basin. This basin encompasses Santa Barbara, San Luis Obispo, and Ventura Counties. Santa Barbara County is divided into South County and North County, and VAFB is located in North County.

The Federal Clean Air Act (CAA) was established in the late 1950s and amended several times since in an effort to ensure that minimum levels of air quality are maintained in all areas of the United States. These minimum levels were based upon health-related exposure levels and were termed National Ambient Air Quality Standards (NAAQS). The NAAQS represent the allowable ambient levels of air pollution. They specify the maximum allowable concentration of a pollutant or a class of pollutants in the atmosphere and thus characterize the amount of exposure deemed safe to the public. Pollutants for which NAAQS have been established include nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), suspended particulate matter less than or equal to 10 microns in aerodynamic diameter (PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), and ozone (O<sub>3</sub>). These are often termed "criteria pollutants."

Primary NAAQS standards are intended to reflect levels of air quality and include an adequate margin of safety deemed necessary to protect the public health. Areas found to be in violation of the primary standards are termed "nonattainment areas." The secondary NAAQS standards reflect the levels of air quality necessary to protect public welfare from other anticipated adverse effects of pollutants.

Under CAA, state and local authorities have been given primary responsibility for assuring that their respective regions are in attainment of, or have a verifiable plan to attain, the NAAQS. This provision also gives state and local agencies authority to promulgate more stringent ambient air quality standards should they so desire. In California, the California Air Resources Board (CARB) has promulgated the California Ambient Air Quality Standards (CAAQS), which in some cases are more stringent than the NAAQS.

An area is designated as being in attainment for a particular criteria pollutant if ambient concentrations in that area are below the corresponding standard. Areas that do not attain the NAAQS are required by CAA to prepare Air Quality Attainment Plans (AQAPs) in order to formulate a program of controls for existing and proposed sources of air pollutant emissions,

such that attainment of the NAAQS may be achieved by a certain target date. Similarly, areas that do not attain the CAAQS are required to develop a program of controls for existing and proposed sources of emissions in order to attain the CAAQS by a particular date. The Santa Barbara County Air Pollution Control District (SBCAPCD) is responsible for developing plans for attainment of both NAAQS and CAAQS. Santa Barbara County, including the North County area, is designated as a "moderate" O<sub>3</sub> nonattainment area for the NAAQS, and has developed a plan which demonstrates attainment of the federal O<sub>3</sub> standards by 1996. Similarly, Santa Barbara County is designated as a "severe" nonattainment area for O<sub>3</sub> under the 1988 California CAA, and has submitted a plan to achieve attainment with CAAQS by the end of 1997.

It should be noted that three violations of the federal ozone standard were recorded in Santa Barbara County in May of 1996. As a result, the County may be reclassified to "serious", the next highest nonattainment category under the federal Clean Air Act. As of August 1996, the SBCAPCD is working the USEPA and the CARB to determine the implications of these recent ozone standard violations on the County's air quality planning.

Santa Barbara County is in attainment of federal PM<sub>10</sub> standards, but it is nonattainment for state PM<sub>10</sub> standards. Since the SBCAPCD considers the area nonattainment for PM<sub>10</sub>, this pollutant and its precursors, including oxides of sulfur (SO<sub>x</sub>), are regulated by the SBCAPCD under New Source Review (NSR) rules.

The ambient air quality for greater VAFB as well as the immediate area of SLC-2W launch operations is well documented. The VAFB Watt Road monitoring station provides the most appropriate current ambient air quality data for the SLC-2W area. This station is located approximately 5 km (3 miles) east of the launch site for the Delta project. The Watt Road station monitors O<sub>3</sub>, CO, SO<sub>2</sub>, NO<sub>2</sub>, and PM<sub>10</sub>. Table 3-1 compares 1993 and 1994 monitored concentrations of O<sub>3</sub>, CO, SO<sub>2</sub>, NO<sub>2</sub>, and PM<sub>10</sub> to the ambient air quality standards. The two years' data indicate compliance with the air quality standards in the vicinity of the project.

### **3.1.3 Air Quality Rules and Regulations**

The proposed project will be subject to federal, state, and local rules and regulations, as implemented through provisions of the CAA of 1970, as amended (42 USC 740 *et seq.*), pertaining to the control of air pollutants emitted to the atmosphere. Region IX of the United States Environmental Protection Agency (EPA) has federal jurisdiction over the area. CARB is responsible at the state level. At the local level, the SBCAPCD has authority over stationary sources of air pollutants in the area.

**TABLE 3-1**
**Background Concentrations of Criteria Pollutants**

Criteria Pollutants	Averaging Period	California or National Ambient Air Quality Standards	VAFB Watt Road 1993 Highest Measured Concentration	VAFB Watt Road 1994 Highest Measured Concentration
O <sub>3</sub>	1 Hour	0.12 ppm (N)	0.085 ppm	0.074 ppm
CO	1 Hour	20 ppm (C)	1.2 ppm	1.9 ppm
NO <sub>2</sub>	1 Hour	0.25 ppm (C)	0.021 ppm	0.023 ppm
SO <sub>2</sub>	1 Hour	0.25 ppm (C)	0.005 ppm	0.009 ppm
PM <sub>10</sub>	24 Hour	50 µg/m <sup>3</sup> (C)	42.0 µg/m <sup>3</sup>	43.5 µg/m <sup>3</sup>
(N) = NAAQS (C) = CAAQS ppm = Parts per million µg/m <sup>3</sup> = Micrograms per cubic meter  Source: SBCAPCD				

On July 19, 1991, the Air Force signed a Memorandum of Agreement (MOA) with the SBCAPCD, which has the following stipulations:

1. VAFB is designated as a single stationary source as defined by the SBCAPCD Rules and Regulations and, in concert with the terms and conditions of the MOA, is subject to the provisions of applicable federal, state, and Air Pollution Control District (APCD) Rules and Regulations governing a single stationary source, and,
2. All existing equipment and applications deemed complete prior to the MOA are exempt from retroactive Best Available Control Technology (BACT) and offsets. The emission baseline for purposes of air quality impact assessment and pre-construction monitoring shall be zero as of the effective date of the MOA. All applications for new or modified equipment on or after the effective date of the July 19, 1991 agreement shall apply the BACT and offset any increases in emissions.

equipment on or after the effective date of the July 19, 1991 agreement shall apply the BACT and offset any increases in emissions.

3. BACT and offsets are to be applied at the ratio and in the manner specified by the APCD rules in effect at the time of application completion. The thresholds for acquiring Air Quality Impact Determination and pre-construction monitoring will also be applied in the manner specified by APCD rules in effect at the time of application completion.

#### **3.1.4 Permitting of SLC-2W Air Pollution Sources**

The SBCAPCD regulations apply only to stationary sources of pollution. Therefore, the launch of the space vehicle is exempt from the permitting process (USAF 1987a). This exception, however, does not include operational support facilities and their corresponding control equipment. Under SBCAPCD regulations, equipment currently permitted as part of the SLC-2W air quality permitting process is summarized in Table 3-2.

### **3.2 Water Quality**

#### **3.2.1 Surface Water**

Surface water resources near VAFB are fed by four watersheds. A watershed or drainage area is the region surrounding a body of water from which precipitation discharges to join the body of water. Shuman Creek drains the northern portion of VAFB. The southern boundary of VAFB is located near the Jalama Creek drainage system. The Santa Ynez River bisects North and South VAFB and comprises the core of the Santa Ynez drainage system. In addition, one minor drainage area, the San Antonio drainage system, is present on North VAFB and is drained by San Antonio Creek (USAF 1989a) (Figure 3-1).

Surface flows have been sampled near SLC-2W and other SLCs on both North and South VAFB (SLC-3E, SLC-3W, and SLC-4W). Dissolved oxygen and pH values are within the EPA's criteria for aquatic life of not less than 5.0 milligrams per liter (mg/l) dissolved oxygen and 6.5 to 8.5 pH units, respectively. High levels of total dissolved solids, chloride, lead, and zinc in the surface water have resulted in water generally recognized as of poor to medium quality (NASA 1991).

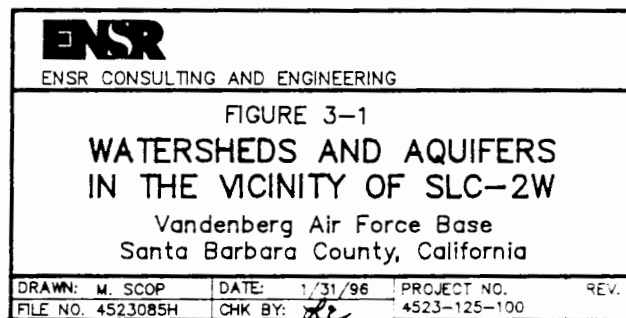
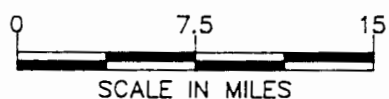
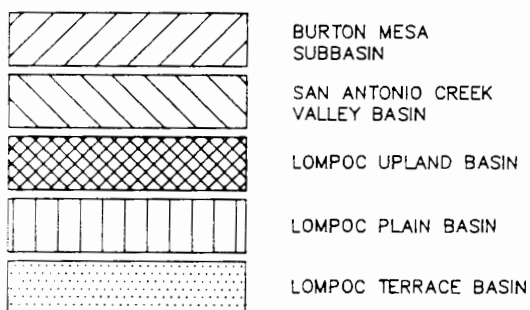
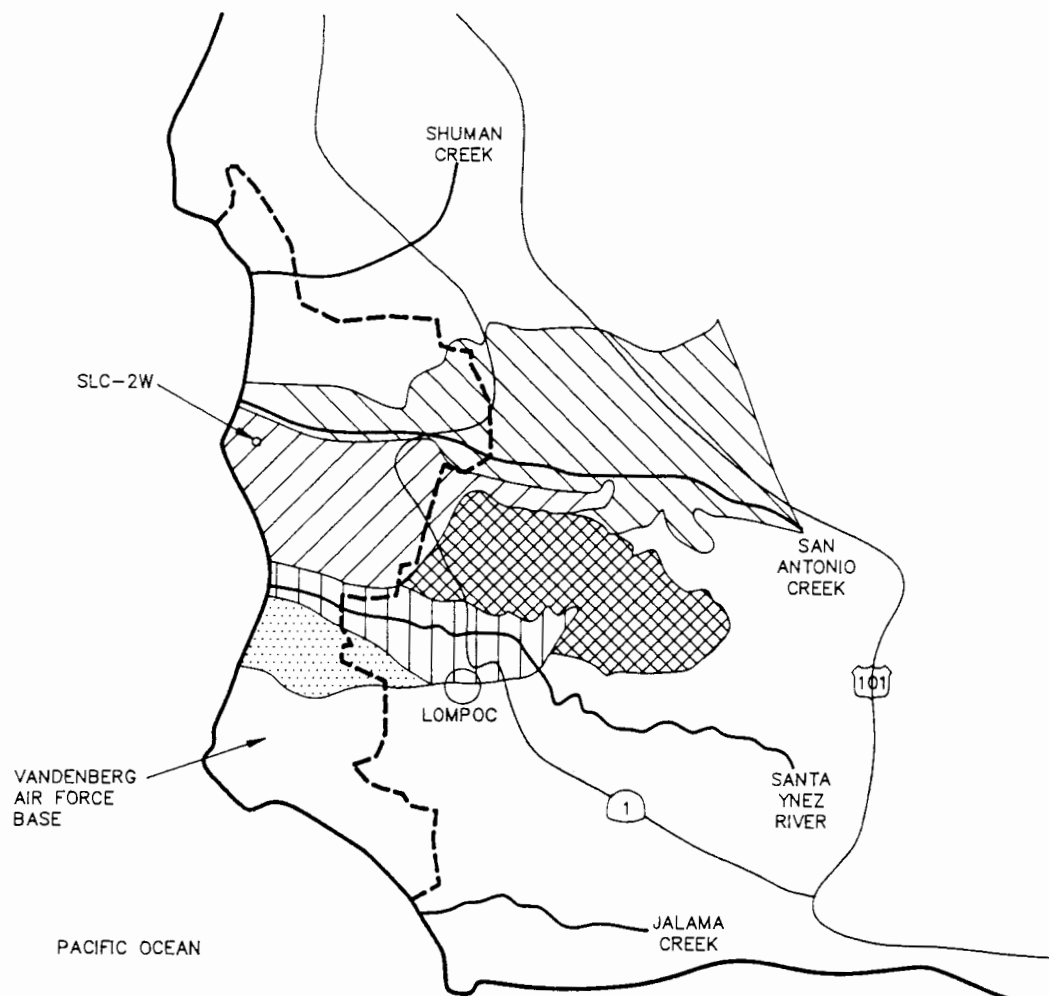
#### **3.2.2 Groundwater**

Groundwater in the vicinity of VAFB is present in several aquifers: Lompoc Upland Basin, Lompoc Plain Basin, Lompoc Terrace Basin, Burton Mesa Sub-basin, and the San Antonio Creek Valley Basin (Figure 3-1). The three Lompoc basins are concentrated along the Santa Ynez



**TABLE 3-2**
**Currently Permitted Air Pollution Sources at SLC-2W**

Permit Number	Equipment	Permitted Emissions	Equipment Capacity	Use
8914	Surface coatings	0.80 metric ton/year (0.88 ton/year)	N/A	Application of surface coatings
8305	Storage vessel	N/A	190 liters (50 gallons)	Purging equipment for liquid rocket fuel and oxidizer transfer systems
	Waste container	N/A	210 liters (55 gallons)	
8306	Lubricating and purging unit	N/A	N/A	Rocket engine flushing system
	Tank cart	N/A	380 liters (100 gallons)	
	Waste container	N/A	210 liters (55 gallons)	
8658a	Storage vessel (N <sub>2</sub> O <sub>4</sub> )	N/A	3,860 liters (1,020 gallons)	Management of N <sub>2</sub> O <sub>4</sub> oxidizer
	Vapor scrubber	N/A	N/A	Management of A-50 fuel
	Storage vessel (A-50)	N/A	3,300 liters (880 gallons)	
	Vapor scrubber	N/A	N/A	
	Water tank	N/A	10,000 gallons	
8751	Internal combustion engines for welding machines (2)	N/A	200 hrs/yr/unit	Fabrication and repair of broken equipment Power tools Rotate crane
	Air compressor (1)	N/A		
	Mobile crane turret (1)	N/A		
8686	Storage vessel	N/A	56,800 liters (15,000 gallons)	Management of RP-1 fuel
N/A:	Not applicable			
Note:	Any changes in permits (i.e., ownership transfer, production rate change, etc.) or status of equipment at SLC-2W will be processed in accordance with the MOA between VAFB and the SBCAPCD dated July 19, 1991.			
Source:	MDA			



River, the Burton Mesa Sub-basin lies between the Santa Ynez River and the San Antonio Creek, and the San Antonio Creek Valley Basin is present along a part of San Antonio Creek. Groundwater is the sole potable water source on VAFB; 10 wells are used to draw water from the first three basins for domestic and operational use. Groundwater pumped by VAFB is also consumed at the adjacent U.S. Penitentiary and Federal Correctional Institute. All VAFB consumption discussed in this EA includes that of the U.S. Penitentiary and Federal Correctional Institute.

Increased withdrawals from the area's groundwater basins for VAFB, municipal, and agricultural use has created an overdraft condition that is affecting the availability and quality of water in these basins. Continued overdraft of the groundwater basins could lead to a decrease in the water table levels, a compaction of the basins, and subsidence of the surface land. Total VAFB groundwater usage (Table 3-3) is approximately 5.3 billion liters (4,300 acre-feet or 1.4 billion gallons) per year (USAF 1989a).

### **3.2.3 Wastewater**

Sanitary wastewater at SLC-2 is discharged to one of several separate roughly 10,000 liter (2,500-gallon) septic systems, which were designed to accommodate a full complement of workers at SLC-2W and SLC-2E. They are periodically pumped out and the contents transported offsite.

## **3.3 Noise**

Noise is defined as "any undesired sound" (Gray 1982). A commonly used unit of sound measurement is the decibel (dB), which is a logarithmic scale of the ratio of sound pressure,  $P$ , to a reference pressure:  $\text{dB} = 20 \log P/P_{\text{ref}}$ , where  $P_{\text{ref}}$  is the threshold of human hearing, which is commonly accepted to be 20 microPascal ( $\mu\text{Pa}$ ) (equivalent to  $2 \times 10^{-5}$  Newtons per meter squared [ $\text{N}/\text{m}^2$ ]) (Michael 1978). A-weighting may be applied to emphasize frequencies in the mid-range of human hearing. In this case, the symbol decibels A-weighted (dBA) is used for sound pressure level. As sound propagates from a source, it decreases with the inverse square of the distance and attenuates due to absorption by the atmosphere and objects such as vegetation, hills, and other barriers. A decrease of 6 dB corresponds to a reduction in sound pressure of one-half.

Since human perception of noises is related to activities and ambient noise levels, a measure of daily noise is presented in terms of  $L_{\text{dn}}$ .  $L_{\text{dn}}$  levels are the time-averaged A-weighted sound level in decibels from midnight to midnight obtained after the addition of 10 decibels to sound levels from midnight to 0700, and from 2200 to midnight (ES 1990).

## VAFB Groundwater Usage

Basin	Groundwater Reservoir Capacity		Recharge Rate		Demand		Overdraft		Users
	acre-feet	liters	acre-feet per year	liters/year	acre-feet per year	liters/year	acre-feet per year	liters/year	
San Antonio Creek Valley	500,000	6.10x10 <sup>8</sup>	8,000	9.76x10 <sup>9</sup>	20,000	2.44x10 <sup>10</sup>	12,000	1.46x10 <sup>10</sup>	North VAFB: (14 percent of demand) 2,850 acre-ft/yr
Lompoc Valley (Lompoc Upland and Lompoc Plain)	300,000	3.66x10 <sup>8</sup>	33,000	4.02x10 <sup>10</sup>	38,000	4.63x10 <sup>10</sup>	5,000	6.10x10 <sup>9</sup>	North VAFB: (3 percent of demand) 1,200 acre-ft/yr
Lompoc Terrace	60,000	7.32x10 <sup>10</sup>	250	3.05x10 <sup>8</sup>	250	3.05x10 <sup>8</sup>	0		South VAFB: (100 percent of demand) 250 acre-ft/yr

Source: USAF 1989a

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### **3.3.1 Noise Regulations**

Federal and state governments have established noise guidelines and regulations for the purpose of protecting citizens from potential hearing damage and various other adverse physiological, psychological, and social effects associated with noise. The California Division of Aeronautics sets standards to control the noise in communities located in the vicinity of airports. A community noise equivalent level (CNEL) of 65 dBA is the state airport noise standard (USAF 1989a).

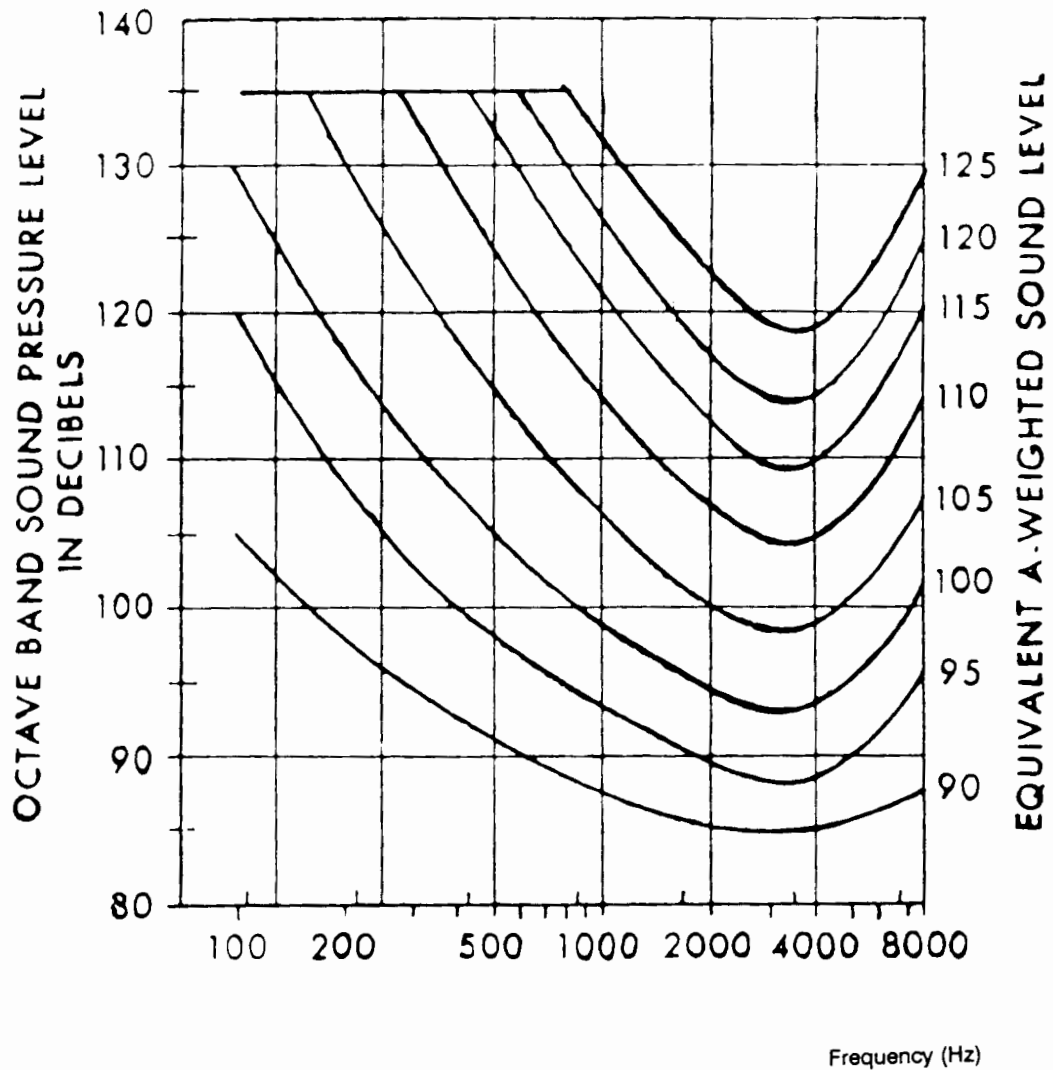
Noise limits also have been established by the Occupational Safety and Health Administration (OSHA) to protect people at their work places (29 CFR 1910.95). For an 8-hour work day, workers must not be exposed to a continuous noise level greater than 90 dBA. In addition, workers should not be exposed to noise levels higher than 115 dBA for periods longer than 15 minutes (USAF 1989a). For the general public, the EPA recommends a 24-hour average noise level of 70 dBA (USAF 1989a). This noise exposure limit will prevent hearing damage from daily exposure to routine noise over a period of months or years. Figure 3-2 presents OSHA's exposure thresholds as a function of noise frequency.

### **3.3.2 Existing Ambient Noise Levels**

Ambient noise levels in the VAFB region are generally low. The major noise sources include aircraft, automobiles, trucks, and trains. North VAFB comprises predominantly open lands with scattered rocket launch operations and support systems. Launch facilities for the Minuteman, Peacekeeper, and other missiles are located there, as are tracking, guidance and meteorological systems support. The rockets produce noise during launches and maintenance periods (USAF 1989a). A noise study conducted by the Occupational and Environmental Health Laboratory in 1986 recorded typical day-night noise levels ranging from  $L_{dn}44$  to  $L_{dn}62$  for areas located in proximity to a launch facility (USAF 1989b). Noise levels recorded for the base residential area produced levels ranging from  $L_{dn}43$  to  $L_{dn}61$ , which are typical of those of a residential area.

The VAFB runway is used by other Air Force bases to train jet aircraft crews in low altitude approach and takeoff techniques. Noise measurements obtained from these flights indicate that flyovers are of short enough duration and intensity so as to cause few complaints from local citizens. Noise intensities obtained did not exceed 79 dBA for any location in the flight pattern.

Southern Pacific trains pass through VAFB on a regular basis. Railroad traffic is a significant noise source both on and off the base.



29 CFR 1910.95

<b>ENSR</b>			
ENSR CONSULTING AND ENGINEERING			
FIGURE 3-2			
OSHA EXPOSURE THRESHOLDS			
DRAWN: M. SCOP	DATE: 1/31/96	PROJECT NO. 4523-125-100	RE.
FILE NO. 4523085G	CHK BY: <i>RE</i>		

### 3.4 Biotic Resources

The topographic and geologic diversity of VAFB and adjacent lands creates an environment exhibiting high species diversity as well as a high degree of native species. VAFB is located in the transition zone between the cool moist conditions of northern California and the semi-desert conditions of southern California. Many species of plants and animals are observed to reach their northern or southern limits in this area.

#### 3.4.1 Flora and Fauna

Although much of the vegetation on VAFB has been disturbed by human activity during the past century, natural vegetation communities do occur. These communities include southern foredunes, coastal scrub, central dune scrub, chaparral, coast live oak woodland, grassland, southern bishop pine forest, tanbark oak forest, and various wetlands. Bishop pine, tanbark oak forests, and the Burton Mesa Chaparral on VAFB are ecologically important because of their rarity in Santa Barbara County. Many of these communities are quite limited in areal extent (USAF 1989a).

Disturbances to vegetation communities include grazing and fire, construction of fire breaks, installation of communications and utility lines, and other activities associated with military training. Introduced species, such as ice plant (*Carpobrotus edulis*), mission veldt grass (*Ehrharta calycina*), and Pampas grass (*Cortaderia jubata*), are dominant in disturbed areas, and frequently replace native plant species.

Native shrubs characteristic of the coastal dune scrub habitat found in the vicinity of SLC-2W include mock heather (*Ericameria ericoides*), dune lupine (*Lupinus chamissonis*), California sage brush (*Artemisia californica*), and deerweed (*Lotus scoparius*). These and other common plants around SLC-2W are listed on Table 3-4. Vegetation within the facility boundary of SLC-2W is dominated by the coastal dune community with some coastal scrub vegetation. The dune mint (*Monadella crista*), a Federal species of special concern, is moderately common on the dunes south of Building 1628.

No wetlands have been observed onsite although some small, low areas are present. No delineation of jurisdictional wetlands was undertaken for this EA since there is no evidence to indicate their presence.

Common mammalian species occurring at VAFB include mule deer, coyote, bobcat, jackrabbits, cottontails, skunks, ground squirrels, and numerous nocturnal rodents. Reptiles and amphibians are represented by several snakes, the Pacific treefrog, western toad, and the California legless

**TABLE 3-4**  
**Dominant Vegetation in the Vicinity of SLC-2W**

Scientific Name	Common Name	Notes
<b>Coastal Dune Scrub</b>		
<i>Ericameria ericoides</i>	Mock heather	Dominant shrub
<i>Lupinus chamissonis</i>	Dune lupine	--
<i>Artemisia californica</i>	California sagebrush	--
<i>Lotus scoparius</i>	Deerweed	Scattered
<i>Senecio blochmanae</i>	Dune senecio	Occasional, more abundant closer to the dunes
<i>Carpobrotus edulis</i> ( <i>Mesembryanthemum edule</i> )	Fig-marigold or ice plant	Abundant in disturbed areas. (native to S. Africa)
<i>Carpobrotus chilensis</i>	Ice plant	Disturbed areas (introduced; S. Africa)
<i>Conicosia pugioniformis</i>	Ice plant	Occasional (introduced; S. Africa)
<i>Rhamnus californica</i>	Coffee berry	Occasional
<i>Ceanothus cuneatus</i>	Buckbrush	Occasional
<i>Baccharis pilularis</i>	Coyote brush	Occasional (more common away from the ocean)
<i>Salvia mellifera</i>	Black sage	Occasional (areas farthest from the ocean)
<b>Coastal Dune Community</b>		
<i>Monardella crista</i>	Dune mint	Reasonably abundant on sandy dune area closest to ocean, in the transect studied
<i>Eriogonum parvifolium</i>	Dune buckwheat	Occasional
<i>Croton californicus</i>	Croton	Occasional
<i>Erharta calcina</i>	Veldt grass	Common introduced species
<b>Source: ENSR 1996</b>		



**TABLE 3-5**
**A Partial List of Animals Expected to Occur Near SLC-2W**

Common Name	Scientific Name
<b>Birds</b>	
Brown pelican	<i>Pelecanus occidentalis californias</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Turkey vulture	<i>Cathartes aura</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Northern harrier	<i>Circus cyaneus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
American kestrel	<i>Falco sparverius</i>
American peregrine falcon	<i>Falco peregrinus anatum</i>
Killdeer	<i>Charadrius vociferus</i>
Mountain plover	<i>Charadrius montanus</i>
Western snowy plover	<i>Charadrius alexandrinus nivosus</i>
Western gull	<i>Larus occidentalis</i>
Heerman's gull	<i>Larus heermanni</i>
California least tern	<i>Sterna antillarum browni</i>
Elegant tern	<i>Sterna elegans</i>
Mourning dove	<i>Zenaida macroura</i>
Burrowing owl	<i>Speotyto cunicularia</i>
Scrub jay	<i>Aphelocoma coerlescens</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Bell's sage sparrow	<i>Amphispiza belli belli</i>
House finch	<i>Carpodacus mexicanus</i>

**TABLE 3-5 (Cont'd)**
**A Partial List of Animals Expected to Occur Near SLC-2W**

Common Name	Scientific Name
<b>Reptiles</b>	
Western fence lizard	<i>Sceloporus occidentalis</i>
Southern alligator lizard	<i>Elgaria multicarinata</i>
California horned lizard	<i>Phrynosoma coronatum frontale</i>
California legless lizard	<i>Anniella pulchra</i>
Gopher snake	<i>Pituophis melanoleucus</i>
Western rattlesnake	<i>Crotalus viridis</i>
<b>Mammals</b>	
Brush rabbit	<i>Sylvilagus bachmanii</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
California pocket mouse	<i>Perognathus californicus</i>
Agile kangaroo rat	<i>Dipodomys agilis</i>
White-footed mice	<i>Paronyscus</i> spp.
Coyote	<i>Canis latrans</i>
Mule deer	<i>Odocoileus hemionus</i>
California sea lion	<i>Zalophus californianus</i>
Harbor seal	<i>Phoca vitulina</i>
Southern sea otter	<i>Enhydra lutris nereis</i>
<b>Source: USAF 1992</b>	

lizard, among others. Bird species are diverse on VAFB, and include redtailed hawks, America kestrels, white-tailed kites, and numerous common land birds. Shore birds are abundant on all sandy beaches. Sea bird nesting colonies are common in the Purisima Point area and include pigeon guillemot, pelagic cormorants, and western gull. While no specific surveys were performed for this EA to document the diversity of animals living near SLC-2W, species expected to occur in the vicinity are listed in Table 3-5.

### 3.4.2 Locally Occurring Special-Status Species

#### 3.4.2.1 Plants

While 35 species of special-status plants occur on VAFB, only the beach layia (*Layia carnosa*) is Federally listed as threatened or endangered. Five plants on-base are Federal candidate species, the surf thistle (*Cirsium rothophilum*), the shagbark manzanita (*Arcto staphylos rudis*), seaside bird's beak (*Cordylanthus rididus* ssp. *littoralis*), the beach spectacle pod, and the Lompoc yerba santa (*Eriodictyon capitatum*). Of these five plants, the state of California lists the surf thistle and beach spectacle pod as threatened, the seaside bird's beak as endangered, and the Lompoc yerba santa as rare. The shagbark manzanita is not listed by the state of California for any special status. A listing of Federal and State special-status plant species expected to occur on VAFB is presented in Table 3-6. Also listed in Table 3-6 are plant species at VAFB which were cross-referenced with the California Native Plant Society (CNPS) listing of plants which are rare and endangered in California and elsewhere (List 1b) and plants of limited distribution (List 4). This was incorporated into the EA to provide a more comprehensive review of the flora at VAFB.

Only four special-status plants are expected to occur near SLC-2W: dune mint, San Luis Obispo monardella (*Monardella frutescens*), black-flowered figwort (*Scrophularia atrata*), and Kellog's horkelia (*Horkelia cuneata* ssp. *sericea*). All four plants are Federal species of special concern and are also on the California Native Plant Society (CNPS) List 1B (plants rare and endangered in California and elsewhere).

The area proposed for the road and parking lot were surveyed for the occurrence of these four species. The substrate and other factors were not suitable for the latter three species, San Luis monardella, fig wort, and horkellia. The dune mint was present in a disjointed band in a low area north of the service road to SLC-2E (Figure 3-3).

TABLE 3-6

## Special-Status Plants Known or Expected to Occur in the Vicinity of SLC-2W

Scientific Name (Common Name)	Habitat	Current Range (notes)	Status Fed/ State/ CNPS
<i>Abronia maritima</i> (Pacific silver fir)	Coastal strand	San Luis Obispo County to California/Mexico border	--/--/4
<i>Agrostis hooveri</i> (Hover's bent grass)	Dry, sandy foothill areas	San Luis Obispo and Santa Barbara Counties	--/--/4
<i>Arctostaphylos purissima</i> (Purissima manzanita)	Chaparral	Burton Mesa and adjacent areas	--/--/1B
<i>Arctostaphylos rudis</i> (Shagbark manzanita)	Chaparral	Burton Mesa; Purisima Hills; Lompoc Canyon; Point Sal, and Nipomo Mesa	SSC/--/1B
<i>Arctostaphylos tomentosa</i> ssp. <i>eastwoodiana</i> (Eastbank Tomentose manzanita)	Chaparral	Monterey Peninsula, San Luis Obispo County	--/--/1B
<i>Calandrinia breweri</i> (Brewer's calandrinia)	Chaparral	Sonoma and Mariposa Counties to the California/Mexico border	--/--/4
<i>Chorizanthe rectispina</i> (One-awned spineflower)	Chaparral, valley grassland	Coastal ranges from San Benito County to Santa Barbara County and interior plains to Sierran foothills in Kern County	SSC/--/1B
<i>Cirsium rhotophyllum</i> (Surf thistle)	Active dunes systems.	Pt. Arguello and Rocky Point	FC/ST/1B
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> (Seaside bird's beak)	Chaparral	Burton Mesa	--/SE/1B
<i>Delphinium parryi</i> ssp. <i>blochmanae</i> (Dune Larkspur)	Chaparral and fixed dunes	Nipomo Mesa in San Luis Obispo to Lompoc in Santa Barbara County	SSC/--/1B
<i>Dichondra occidentalis</i> (Western dichondra)	Coastal sage scrub and Chaparral	Los Angeles, Orange, and San Diego Counties and Santa Cruz, Santa Rosa, and Santa Catalina Islands	--/--/4
<i>Dithyrea maritima</i> (Beach spectacle pod)	Coastal dunes.	Coastal dunes	SSC/ST/1B
<i>Dudleya blochmaniae</i> ssp. <i>blochmaniae</i> (Blochman's dudleya)	Pasture/vernal pools	Point Sal, Burton Mesa	SSC/--/1B
<i>Erigeron blochmaniae</i> (Blochman's leafy daisy)	Endemic; on dunes and coastal strand area.	Canada Honda Creek; Surf; Burton Mesa; Santa Maria River; Oso Flaco Lake; Oceano, and Morro Bay	--/--/1B

TABLE 3-6 (Cont'd)

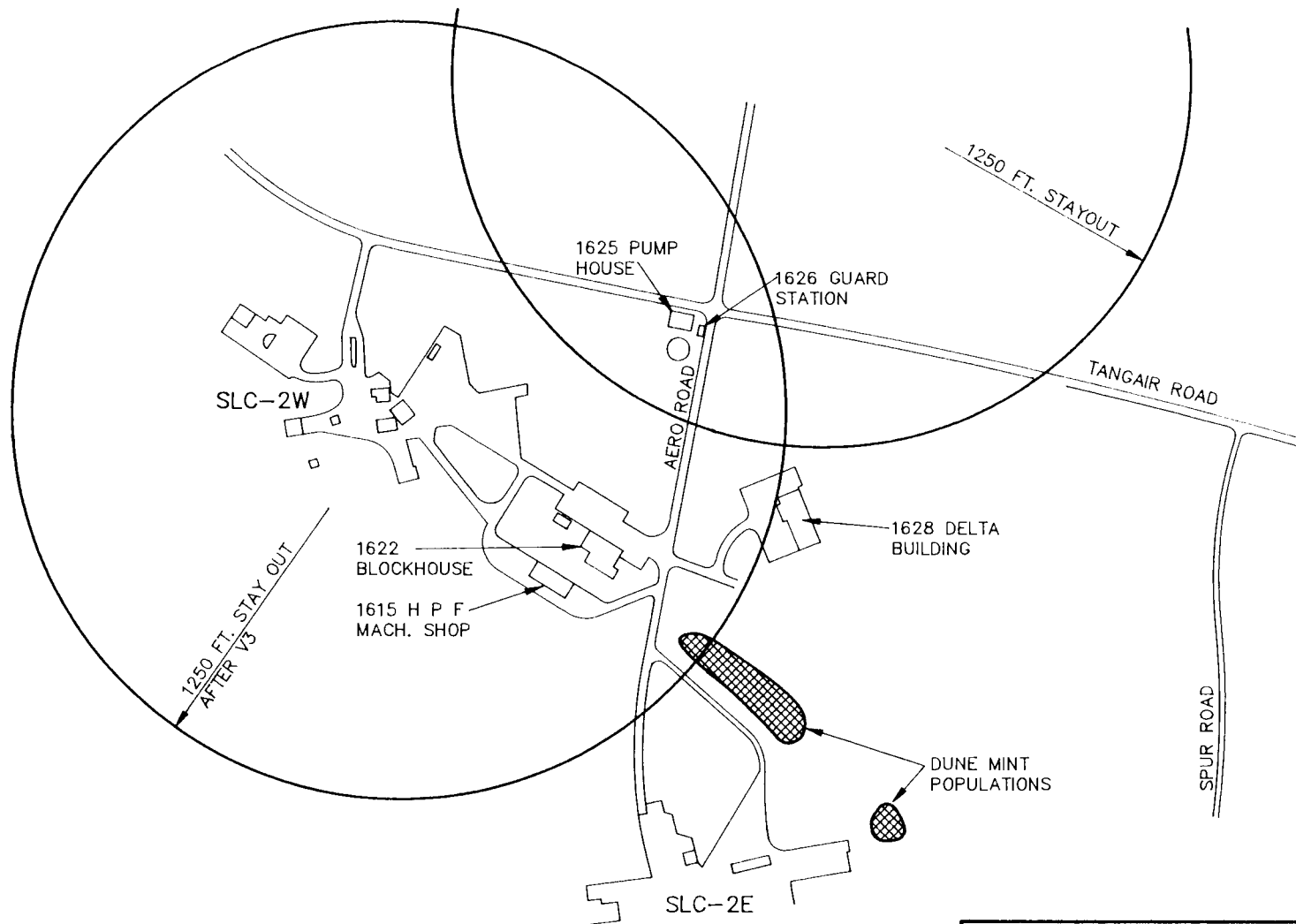
## Special-Status Plants Known or Expected to Occur in the Vicinity of SLC-2W

Scientific Name (Common Name)	Habitat	Current Range (notes)	Status Fed/ State/ CNPS
<i>Erigeron sanctarum</i> (Saint's daisy)	Chaparral	35th St. Yerba Santa site	--/--/4
<i>Eriodictyon capitatum</i> (Lompoc yerba santa)	Chaparral	Pine Canyon, 35th Street	FC/SR/1B
<i>Eriodictyon capitatum</i> ssp <i>lompocense</i> (Lompoc Yerba Santa) Note: Subspecies was not specifically listed in the CNDDDB.	Brushy slopes below 1,000 feet elevation	Santa Barbara County north of Lompoc	--/--/4
<i>Erysimum insulare</i> var. <i>suffrutescens</i> (Island wallflower)	Dune	Surf; location not specified (not recently observed)	--/--/4
<i>Horkelia cuneata</i> ssp <i>sericea</i> (Kellog's horkelia)	Coastal scrub	Sonoma County to Santa Barbara County	SSC/--/1B
<i>Juglans californica</i> var <i>californica</i> (Southern California black walnut) Note: Variant was not specifically listed in CNDDDB.	Southern oak woods below 2,500 feet elevation	Ventura County to San Bernardino County and Santa Ana Mountains	--/--/4
<i>Juncus acutus</i> var <i>leopoldii</i> (Southwestern spiny thrush)	Coastal salt marsh	San Luis Obispo County to California/Mexico border	--/--/4
<i>Layia carnosa</i> (Beach Layia)	Coastal scrub	South VAFB	FE/SE/1B
<i>Leptodactylon californicum</i> ssp <i>tomentosum</i> (Fuzzy prickly phlox)	Chaparral and foothill woods	San Luis Obispo County to San Gabriel and Santa Ana Mountains	--/--/4
<i>Malacothrix incana</i> (Dune malacothrix)	Dune systems	Dune systems	--/--/4
<i>Monardella crispa</i> (Dune mint)	Arrested and moving dunes near ocean	Surf; Burton Mesa; Purisima Hills, and mouth of Santa Maria River to ocean	SSC/--/1B
<i>Monardella frutescens</i> (San Luis Obispo monardella)	Active, stabilized dunes	Coastal San Luis Obispo County	SSC/--/1B
<i>Monardella undulata</i> var. <i>undulata</i> (Curly-leafed monardella)	Low elevation sandy, coastal areas	Oak Canyon; Marin County to Santa Barbara County	--/--/4
<i>Mucronea californica</i> (California spineflower)	Coastal sage scrub and chaparral	San Luis Obispo County to California/Mexico border	--/--/4
<i>Piperia michealii</i> (Purple-flowered piperia)	Chaparral and dry woods	Sierra Nevada to San Diego Count Coast	--/--/4

TABLE 3-6 (Cont'd)

## Special-Status Plants Known or Expected to Occur in the Vicinity of SLC-2W

Scientific Name (Common Name)	Habitat	Current Range (notes)	Status Fed/ State/ CNPS
<i>Prunus fasciculata</i> var. <i>puncata</i> (Desert almond)	Chaparral	Graciosa project area	--/--/4
<i>Psilocarphus tenellus</i> var. <i>globiferus</i> (Round wooly marbles)	Dried vernal cismontane and montane pools	Cismontane and montane California	--/--/4
<i>Quercus parvula</i> var. <i>parvula</i> (Santa Cruz Island oak)	Chaparral and Bishop pine	Burton Mesa	--/--/4
<i>Sanicula hoffmannii</i> (Hoffman's sanicle)	Coastal sage scrub	San Luis Obispo and Santa Barbara Counties	--/--4
<i>Scrophularia atrata</i> (Black-flowered figwort)	Endemic; patchy; small to large colonies in moist swales with willows, usually growing up through <i>Baccharis</i> or other vegetation; diatomaceous and calcareous hills around Lompoc. Also in coastal sage scrub and other communities.	Point Conception to sandy Burton Mesa; Bishop pine forests about Lompoc, north to Corralillos Canyon near Point Sal; Avila area; south to Coal Oil Point, and Goleta	SSC/--/1B
<i>Suaeda taxifolia</i> (Wooly sea blite)	Coastal salt marsh	Santa Barbara to San Diego Counties	--/--/4
<b>Category Explanations:</b>  <b>Federal Status Categories</b> FE: Federally listed, endangered. FC: Candidate for federal listing as threatened or endangered SSC: Species of special concern (formerly Category 2 species).  <b>State Status Categories</b> ST: State listed, threatened. SE: State listed, endangered. SR: State listed, rare.  <b>California Native Plant Society Listing (Smith and York 1964) Categories</b> 1B: (List 1B) Plants are rare and endangered in California and elsewhere. 4: (List 4) Plants of limited distribution (a watch list).  <b>Note:</b> Only the codes used in this table are identified.  <b>Source:</b> Chip Gillespie 1996			



0 250' 500' 1000'

APPROXIMATE SCALE IN FEET

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FIGURE 3-3  
DUNE MINT POPULATION LOCATIONS

Vandenberg Air Force Base  
Santa Barbara County, California

DRAWN: M. SCOP	DATE: 6/17/96	PROJECT NO. 4523-125-100	REV.
FILE NO. 4523125a	CHK BY:		

### 3.4.2.2 Animals

Ten federally listed threatened or endangered animal species are known to occur on VAFB. These animals, protected under the Endangered Species Act (ESA), include the tidewater goby (*Eucyclogobius newberryi*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), California red legged frog (*Rana aurora draytonii*), Southern sea otter (*Enhydra lutris neveis*), California brown pelican (*Pelecanus occidentalis californias*), California least tern (*Sterna antillarum browni*), western snowy plover (*Charadrius alexandrinus nivosus*), bald eagle (*Haliaetus leucocephalus*), Southwestern willow flycatcher (*Epidonax trailli extimus*), and the American peregrine falcon (*Falco peregrinus anatum*). Of these 10 species, the tidewater goby, unarmored threespine stickleback, Southwestern willow flycatcher, bald eagle, and California red legged frog are not expected to occur within 3 km (2 miles) of SLC-2W and are not considered further in this document (Nancy Read, 1995). Table 3-7 lists the special-status animals known or expected to occur in the vicinity of SLC-2W.

California brown pelicans occur at various locations along the coast although they breed only on the Channel Islands. Pelicans on VAFB primarily roost on rocky bluffs and offshore rocks, and feed in shallow waters of the nearshore ocean and estuaries. During 1995, USFWS conducted monthly counts at pelican roost sites on and near VAFB from Point Sal to the South VAFB boathouse. Purisima Point is one of the most consistently used sites registering the highest pelican count (510 individuals) for any site during the August 1995 survey. Numbers are quite variable through out the year, with the highest numbers occurring from June to December, (Nancy Read 1996 citing, Peretska 1996).

California least terns have historically used many isolated locations along the California coast for breeding (Figure 3-4). Four of these historic sites are located on VAFB (Figure 3-5), including the mouth of San Antonio Creek, Beach 2 south of San Antonio Creek, Purisima Point near SLC-2 (Figure 3-6), and the mouth of the Santa Ynez River. While all these areas are still used by least terns as foraging, roosting, and post-breeding dispersal areas, only Beach 2 and Purisima Point have records of least tern breeding in 1994 and/or 1995. The nesting activity of the least tern colonies has been monitored by VAFB biologists since 1978. The number of least tern nests on VAFB are presented in Figure 3-7 for each of the three known nesting sites. Numbers of nests have varied from lows of 10 nests to highs of nearly 50. As migratory visitors to VAFB, least terns are typically at VAFB from mid April to late August.

Western snowy plovers breed at most beaches along VAFB and share similar local breeding grounds with the least terns near SLC-2W (Figure 3-8). Routine monitoring of snowy plovers on VAFB has been occurring since 1993. In the summers of 1994 and 1995, roughly 200 snowy plovers were located on VAFB (Figure 3-9) while the winter censuses recorded over twice that



TABLE 3-7

## Special-Status Animals Known or Expected to Occur in the Vicinity of SLC-2W

Common Name ( <i>Genus species</i> )	Habitat	Current Range	Occurs on VAFB	Occurs within 2 miles of SLC-2W	Status* Fed/Calif
<b>Mammals</b>					
Desert woodrat ( <i>Neotoma lepida intermedia</i> )	Coastal sage scrub/ inland deserts	Central and Southern California	Yes	No	SSC/-
Fringed myotis ( <i>Myotis thysanodes</i> )	Caves, abandoned structures, and attics	Western United States, northern Mexico	Potential	Potential	SSC/-
Greater western mastiff bat ( <i>Eumops perotis californicus</i> )	Prefers cracks and holes in man-made structures	Central and southern California, portions of Arizona, N. Mexico, and Texas	Potential	Potential	SSC/-
Long-eared myotis ( <i>Myotis evotis</i> )	Light woods, buildings, occasionally in caves	Western United States	Potential	Potential	SSC/-
Long-legged myotis ( <i>Myotis volans</i> )	Crevices in rock ledges and buildings	Western United States, southwestern Canada	Potential	Potential	SSC/-
Small-footed myotis ( <i>Myotis ciliolabrum</i> )	Caves and abandoned buildings	British Columbia to Mexico, inland to Sierra Cascades	Potential	Potential	SSC/-
Southern sea otter ( <i>Enhydra lutris nereis</i> )	Near shore waters, primarily where rocky outcrops occur	Ranges from Pismo Beach, San Luis Obispo County north to Santa Cruz County. Introduced population to San Nicolas Island. Resident population off Purisima Point	Yes	Yes	FT/-
Townsend's western big-eared bat ( <i>Plecotus townsendii townsendii</i> )	Rocky outcroppings	Occurs throughout California. No records for VAFB.	Potential	Potential	SSC/CSC
Yuma myotis ( <i>Myotis yumanensis</i> )	Arid caves, tunnels, and buildings	Western United States, northern Mexico	Potential	Potential	SSC/-
<b>Birds</b>					
American peregrine falcon ( <i>Falco peregrinus anatum</i> )	Coastal cliffs	Throughout most of California - migrant/ wintering individuals observed occasionally along all of VAFB coastline; breeds on south VAFB	Yes	Yes	FE/SE
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Large lakes and wetlands	Throughout most of California - wintering individuals occasionally sighted on VAFB	Yes	No	FE/SE

TABLE 3-7 (Cont'd)

## Special-Status Animals Known or Expected to Occur in the Vicinity of SLC-2W

Common Name ( <i>Genus species</i> )	Habitat	Current Range	Occurs on VAFB	Occurs within 2 miles of SLC-2W	Status* Fed/Calif
Belding's savannah sparrow ( <i>Passerculus sandwichensis beldingi</i> )	Salt marshes	Central and southern California. Observed south of VAFB; (unknown if range extends as far north as VAFB).	Possible	No	SSC/SE
Bell's sage sparrow ( <i>Amphiapiza belli belli</i> )	Coastal sage scrub and chaparral	Coastal ranges of central and Southern California. Year-round resident on VAFB.	Yes	Yes	SSC/CSC
California brown pelican ( <i>Pelecanus occidentalis californias</i> )	Near shore waters	Occurs along central California coast. Breeds on the Channel Islands; some breeding activities near Point Lobos, Monterey County. Roosts at Purisima Point, San Antonio Creek, Santa Ynez River mouth, and rocky coast on south VAFB. Present all year.	Yes	Yes	FE/SE
California least tern ( <i>Sterna antillarum browni</i> )	Sand dunes and near water (i.e., food source)	Nests on sand dunes near San Antonio Creek and Purisima Point. Present mid-April through August.	Yes	Yes	FE/SE
Elegant tern ( <i>Sterna elegans</i> )	Coastline	Baja California, Peru to Chile, north to Washington	Yes	Yes	SSC/-
Ferruginous hawk ( <i>Buteo regalis</i> )	Open country	Fall and winter visitor to region	Yes	No	SSC/-
Large-billed savannah sparrow ( <i>Passerculus sandwichensis rostratus</i> )	Salt marshes, dunes, and open shoreline and fields	Alaska to northern Mexico and as far as Honduras migrant only on VAFB	Possible	No	SSC/-
Little willow flycatcher ( <i>Empidonax traillii brewsteri</i> )	Willow thickets and brushy swamps	Alaska to Panama, generally southwestern United States	Possible	No	SSC/-
Mountain plover ( <i>Charadrius montanus</i> )	Semi-arid plains, grassland, and plateaus	Central and southern California winter migrant	Yes	Yes	FC/-
Saltmarsh common yellowthroat ( <i>Geothlypis trichas sinuosa</i> )	Swamps, marshes, and wet thickets	Canada to Mexico, West Indies and Panama	Possible	No	SSC/-
Southwestern willow flycatcher ( <i>Epidonax trailli extimus</i> )	Undisturbed willow riparian	Sierra Nevada and Coastal Southern California. Occurs occasionally along Santa Ynez River	Yes	No	FE/SE

TABLE 3-7 (Cont'd)

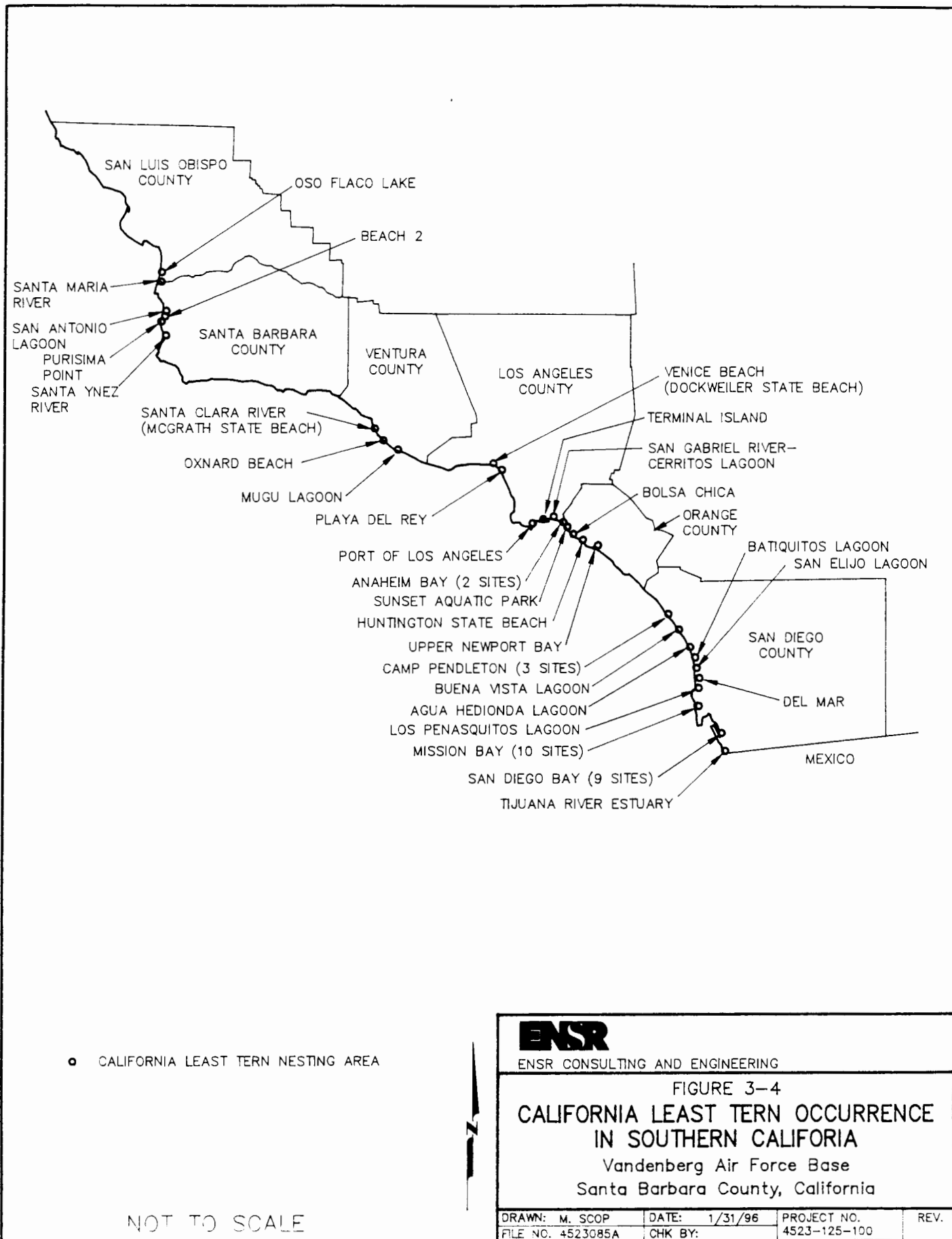
## Special-Status Animals Known or Expected to Occur in the Vicinity of SLC-2W

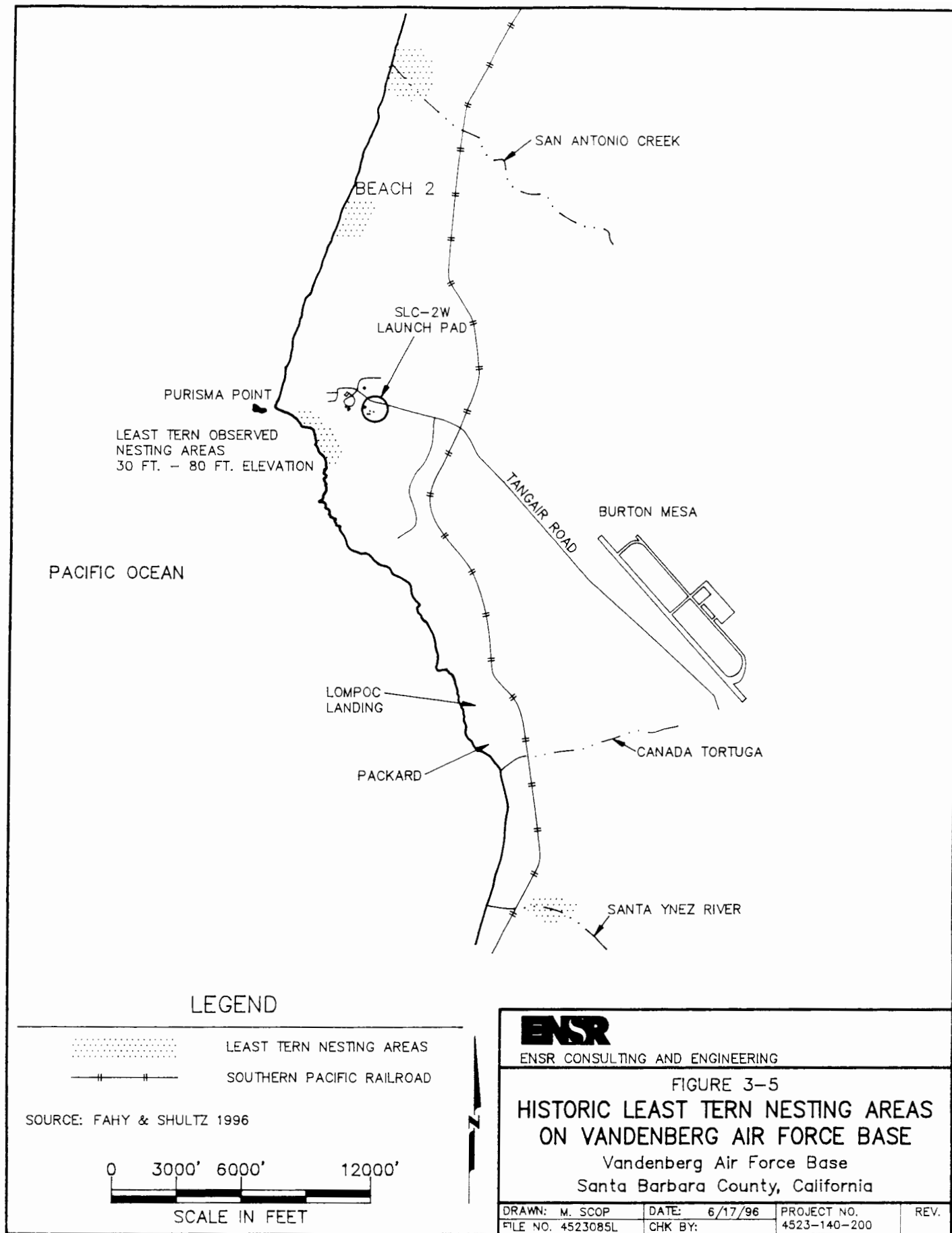
Common Name ( <i>Genus species</i> )	Habitat	Current Range	Occurs on VAFB	Occurs within 2 miles of SLC-2W	Status* Fed/Calif
Southern California rufous-crowned sparrow ( <i>Aimophila ruficeps canescens</i> )	Coastal sage scrub and chaparral	Santa Barbara County to Mexico. Year-round resident on VAFB.	Yes	No	SSC/-
Tri-colored blackbird ( <i>Agelaius tricolor</i> )	Found in dense tule stands, fields, and pastures	Occurs in central and southern California. Migrant during winters on VAFB.	Yes	No	SSC/-
Western snowy plover ( <i>Charadrius alexandrinus nivosus</i> )	Coastal sandy beaches	Coastal areas of California, breeds on sandy beaches on VAFB.	Yes	Yes	FT/-
White-faced ibis ( <i>Plegadis chihi</i> )	Shallow grassy marshes	Central and southern California. Transient visitor to VAFB area.	Yes	No	SSC/CSC
<b>Amphibians/Reptiles</b>					
California horned lizard ( <i>Phrynosoma coronatum frontale</i> )	Scrubland, sandy washes, and grassland	California coast inland to Cascade-Sierra Highlands, Baja, California	Yes	Yes	SSC/-
California red-legged frog ( <i>Rana aurora draytonii</i> )	Perennial ponds and streams	Coastal California	Yes	No	FT/CSC
Silvery legless lizard ( <i>Anniella pulchra pulchra</i> )	Sparse beaches and chaparral	Central and southern California coast regions and inland to highlands	Yes	Possible	SSC/-
Southwestern pond turtle ( <i>Clemmys marmorata pallida</i> )	Perennial ponds and streams	Throughout California	Yes	No	SSC/-
Two-striped garter snake ( <i>Thamnophis hammondi</i> )	Permanent water bodies	Central California coastal and inland	Yes	No	SSC/-
<b>Insects</b>					
Morro Bay blue butterfly	Chaparral	Central California	Yes	Possible	SSC/-
White-sand dune scarab beetle ( <i>Lichnanthe albopilosa</i> )	Coastal dune	Coastal California	Possible	Possible	SSC/-

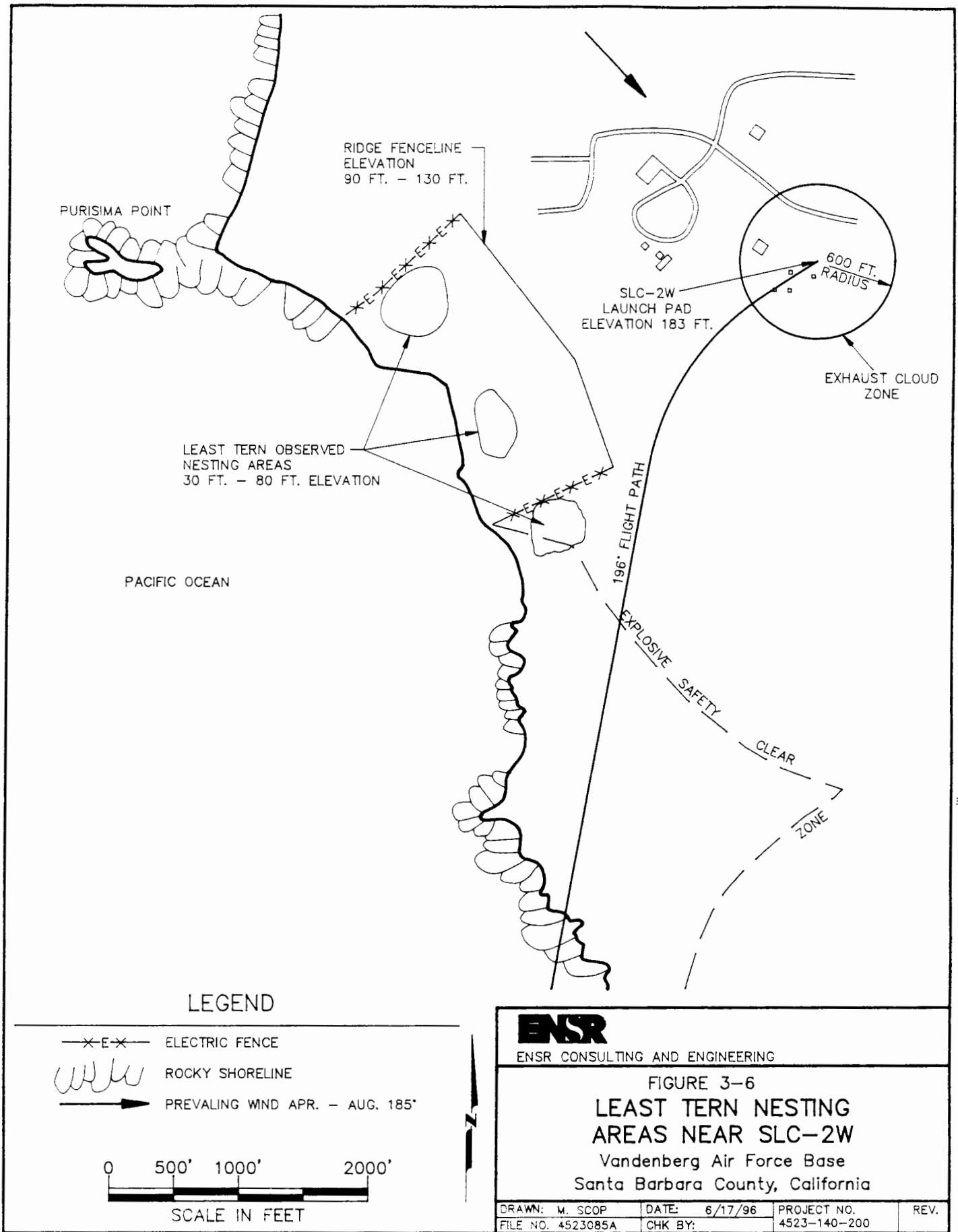
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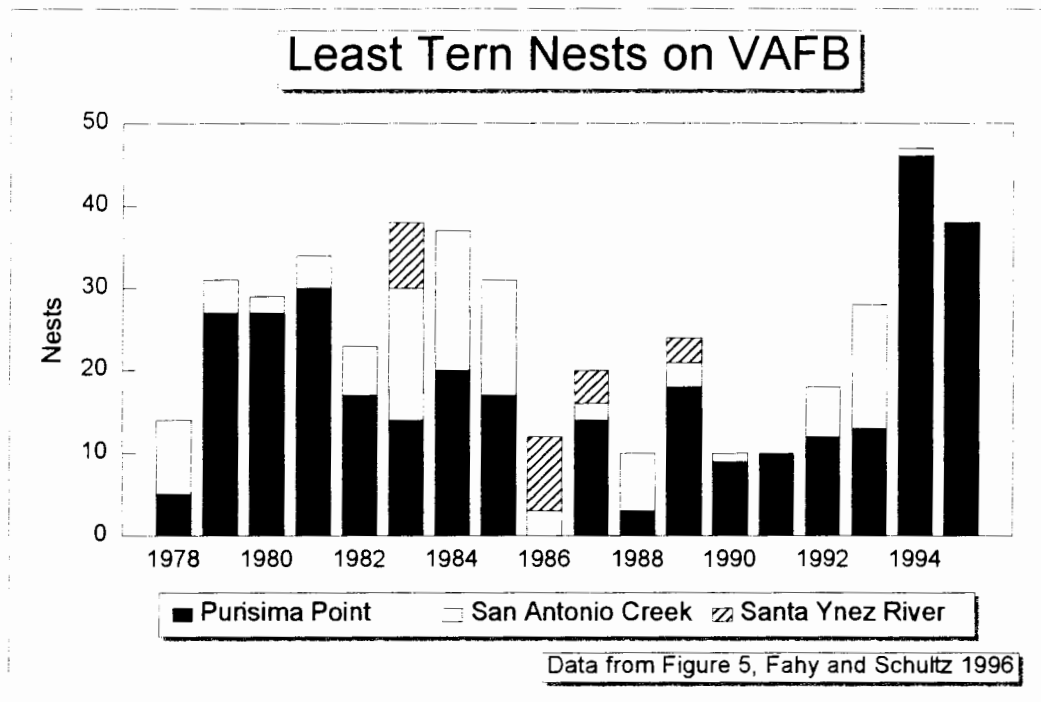
## Special-Status Animals Known or Expected to Occur in the Vicinity of SLC-2W

Common Name ( <i>Genus species</i> )	Habitat	Current Range	Occurs on VAFB	Occurs within 2 miles of SLC-2W	Status* Fed/Calif
<b>Fish</b>					
Arroyo chub ( <i>Gila orcutti</i> )	Coastal streams and lakes	Southern California	Yes	No	SSC/-
Tidewater goby ( <i>Eucyclogobius newberryi</i> )	Coastal wetlands with low salinities	Coastal California	Yes	No	FE/CSC
Unarmored threespine stickleback ( <i>Gasterosteus aculeatus williamsoni</i> )	Perennial stream	Coastal California, San Antonio Creek on VAFB	Yes	No	FE/SE
<p><b>*Category Explanations:</b></p> <p><b>Federal Status Categories</b></p> <p>FE: Federal listed, endangered  FT: Federal listed, threatened  FC: Federal candidate for listing as threatened or endangered  SSC: Species of special concern: data not sufficient to support listing</p> <p><b>State Status Categories</b></p> <p>CSC: California Species of Special Concern  SE: State listed, endangered</p> <p><b>Note:</b> Only the codes used in this table are identified.</p> <p><b>Source:</b> Nancy Read, VAFB</p>					



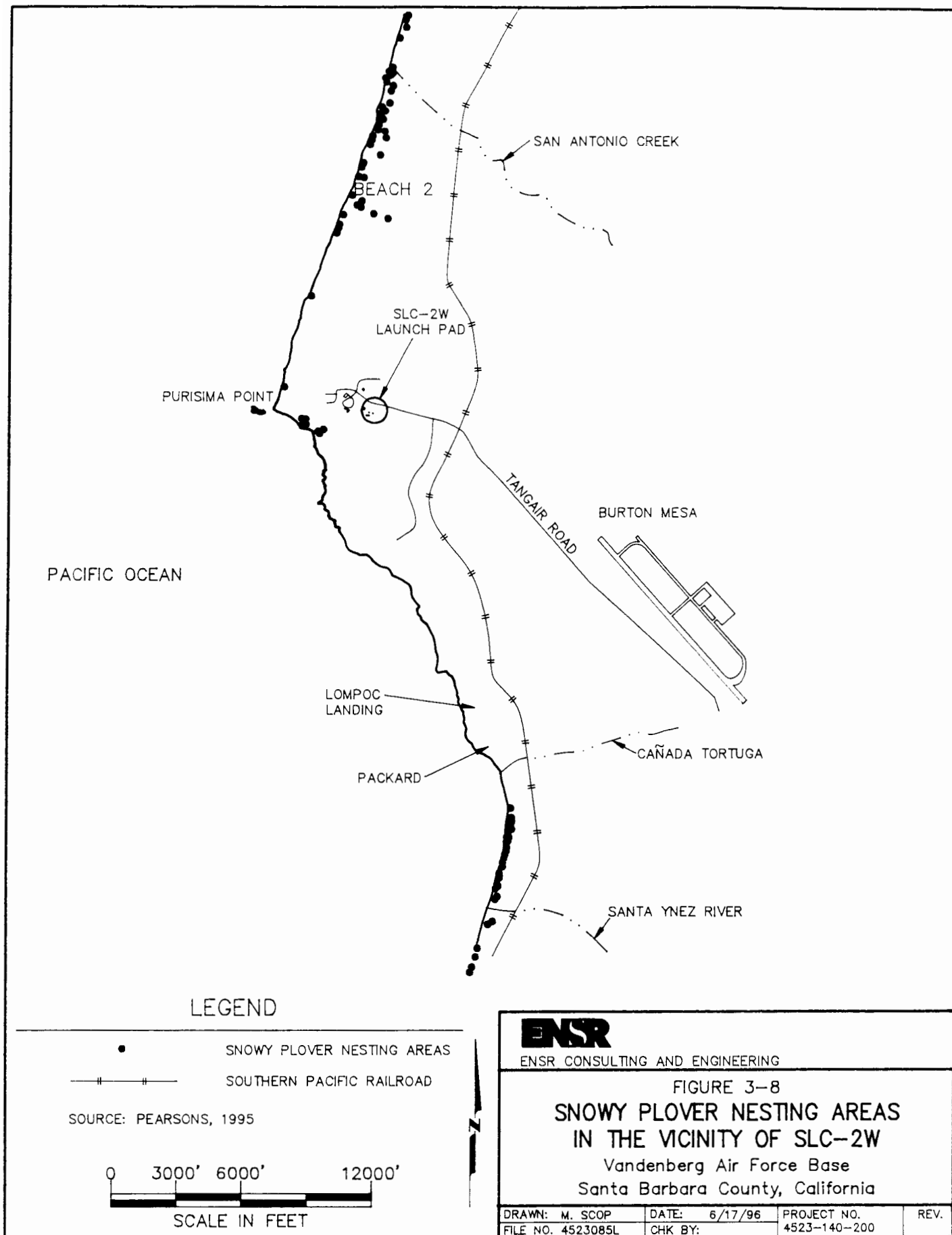






**FIGURE 3-7. Least Tern Nests on VAFB**





# Western Snowy Plovers

Summer Censuses (Late June)

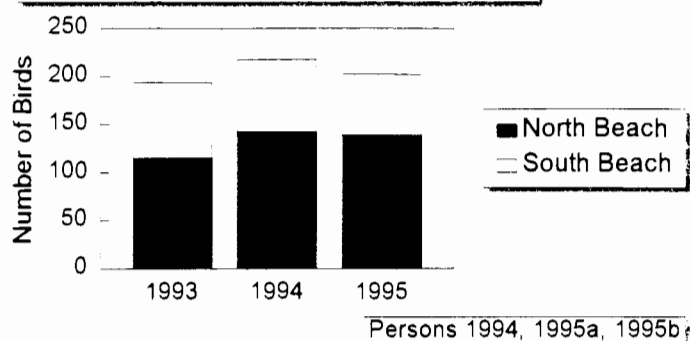


FIGURE 3-9. Summer Censuses (Late June)

# Western Snowy Plovers

Winter Censuses

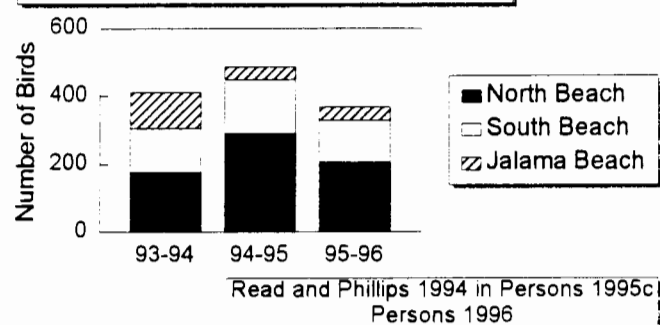


FIGURE 3-10. Winter Census.

# Western Snowy Plovers

Breeding Population Data

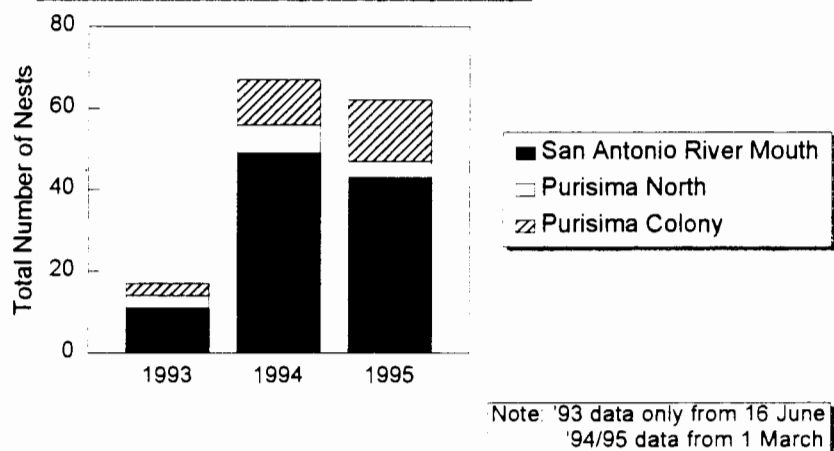


FIGURE 3-11. Breeding Population Data

amount (Figure 3-10). Eighteen to 19 nesting pairs occurred at the Purisima colony/Purisima Point combined (Persons 1994, 1995a, 1995b). Figure 3-11 presents the results of the censuses of nests between 1993 and 1995. Note that the 1993 data are not directly comparable to those for 1994 or 1995 because the 1993 survey began on June 16 while the 1994 and 1995 surveys began on March 1.

Southern sea otters are found at various rocky areas along the VAFB coastline (USAF 1989c). A small breeding colony of sea otters was found near Purisima Point in 1990 and still contains approximately a dozen individuals (Ron Jameson, 1995).

American peregrine falcons are periodic visitors to SLC-2W, and commonly hunt at the Santa Ynez River mouth although they are not known to breed near the site (Nancy Read, 1995).

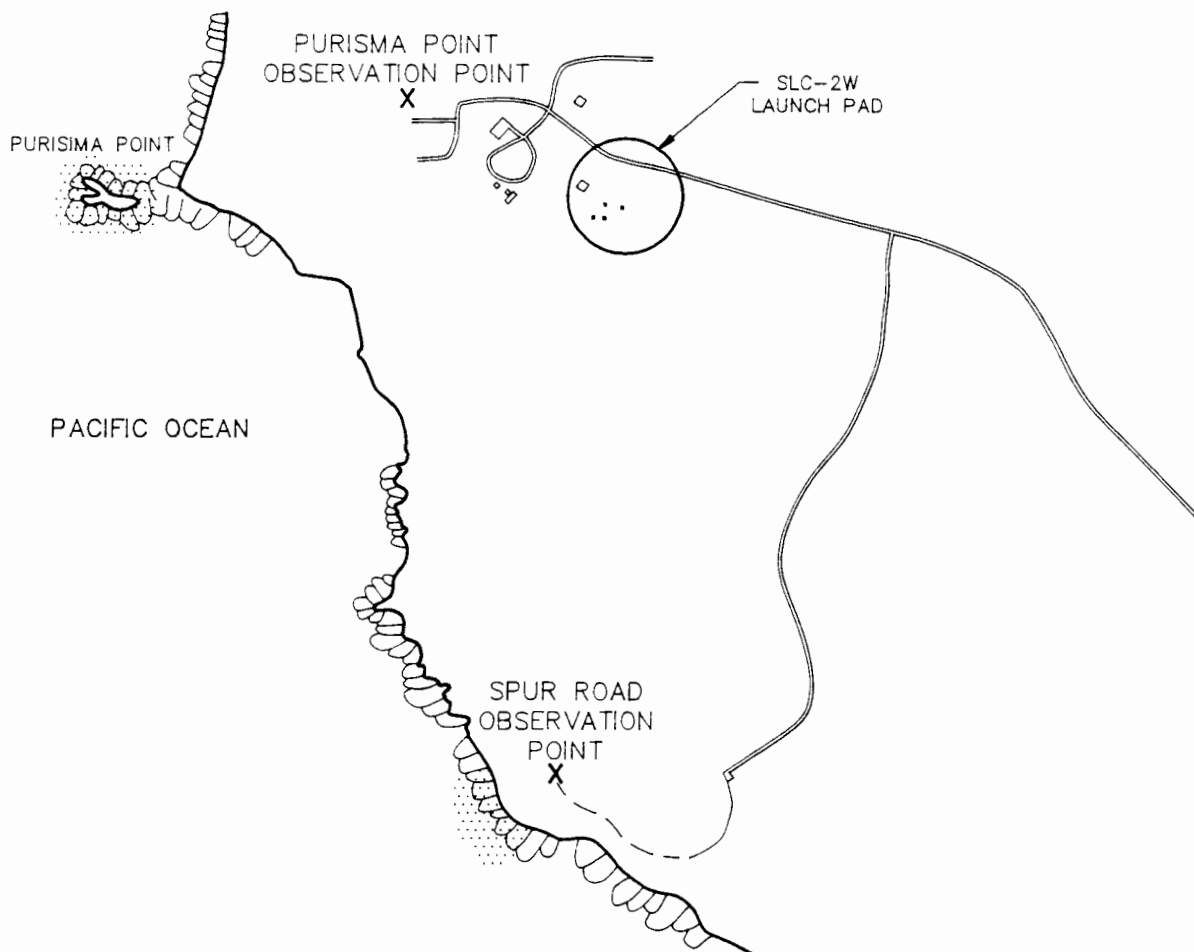
Twenty-six other special-status species also are found on VAFB. Of these 26, one, the mountain plover, is a candidate for protection under the Federal ESA.

The other 25 species are considered SSC by the USFWS. One of these, the Belding's savannah sparrow, is also listed as a California Endangered Species. Of these 25 species, three are known to occur within 3 km (2 miles) of SLC-2W, nine potentially occur within 3 km (2 miles) of SLC-2W, and the remaining 13 are not expected to occur within 3 km (2 miles) of SLC-2W.

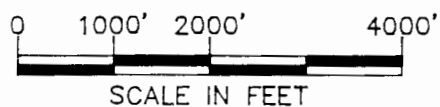
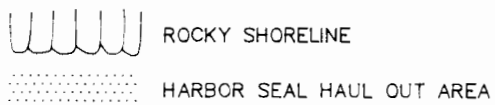
Although SSC are not afforded Federal legal protection under the ESA, consideration for their preservation is typically incorporated into the design of projects on VAFB. In addition, many of the listed, candidate, and SSC species are afforded protection under other acts such as the Migratory Bird Treaty Act (MBTA) or the Marine Mammals Protection Act (MMPA). Thus, although many of the SSC birds listed on Table 3-6 are not protected under the ESA, they may require protection under the MBTA.

Similarly, marine mammals not specifically listed for protection under the ESA are nonetheless covered by the MMPA. A number of marine mammals occur along the coast of VAFB. Harbor seals routinely haul-out at Purisima Point and south of Purisima Point at a location referred to as the Spur Road Site (Figure 3-12). These sites are identified in the NMFS census as a breeding rookery in its annual harbor seal census. Figure 3-13 presents the annual census of seals basewide from 1982 to 1993. Figure 3-14 presents monthly averages of harbor seals at the two locations near SLC-2W. It is likely that other pinnipeds could be occasional visitors to the beaches near the site (Nancy Read, 1995).

Descriptions of the life history of listed species commonly occurring near SLC-2W are presented in Appendix A.



### LEGEND



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### FIGURE 3-12 HARBOR SEAL HAUL OUT AREAS NEAR SLC-2W

Vandenberg Air Force Base  
Santa Barbara County, California

DRAWN: M. SCOP	DATE: 6/17/96	PROJECT NO. 4523-140-200	REV.
FILE NO. 4523085M	CHK BY:		

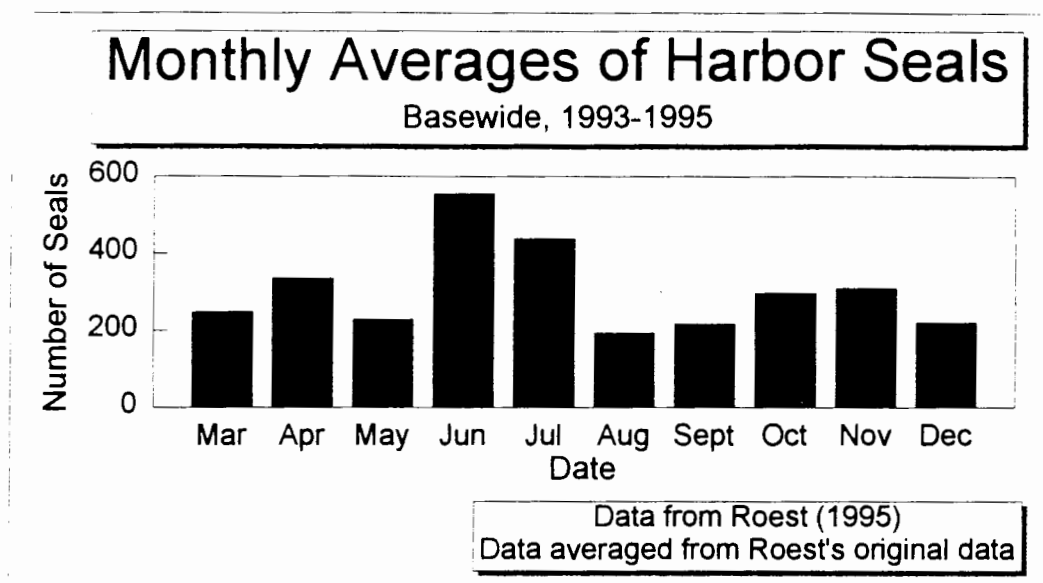


FIGURE 3-13. Harbor Seals at VAFB

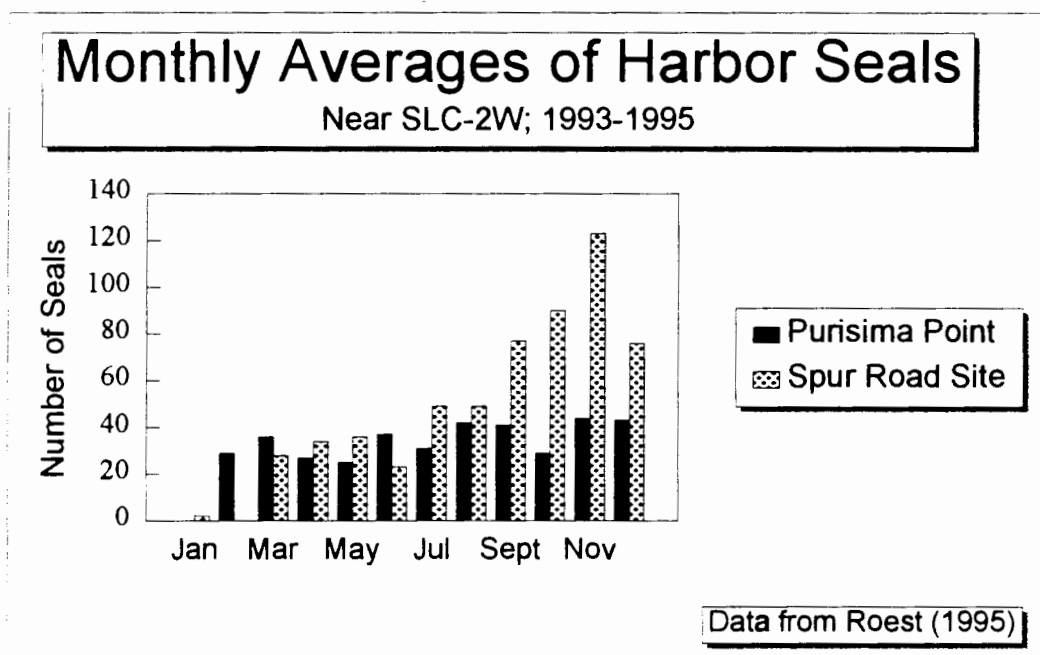


FIGURE 3-14. Monthly Averages of Harbor Seals Near SLC-2W

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### **3.5 Hazardous Materials**

#### **3.5.1 Regulations**

Federal and state regulations (40 CFR 260-267 and Chapter 6.5 of Division 20 of the California Health and Safety Code) designate certain wastes as hazardous and prescribe standards, procedures, and documentation for handling, storage, transporting, treating, and disposing of hazardous wastes properly. VAFB published and approved detailed rules for implementing hazardous waste regulations in its Hazardous Waste Management Plan (USAF 1994c). VAFB also published and approved detailed procedures for dealing with inadvertent releases of oil and hazardous materials in its HAZMAT and Emergency Spill and Response Plan (USAF 1994b).

#### **3.5.2 Hazardous Substances**

The only hazardous substances used in substantial quantities are associated with the rocket launches. The two compounds used in the first stage are RP-1 and LOX. RP-1 is refined kerosine; it can burn if it is exposed to a flame. As a cryogenic liquid, LOX is extremely cold; in its gaseous form it substantially accelerates combustion of burning materials. Roughly 38,000 liters (9,950 gallons, 30,250 Kg, or 66,685 pounds) of RP-1 and 60,000 liters (16,140 gallons, 66,250 Kg, or 146,070 pounds) of LOX are used for a mission.

The two second stage fuels are A-50 and  $N_2O_4$ . Both compounds are hypergolic fuels, i.e. they combust spontaneously when mixed together. Both compounds are highly toxic and corrosive. Roughly 2,100 Kg (4,600 pounds) of A-50 and 4,000 Kg (8,800 pounds) of  $N_2O_4$  are used for a given launch.

#### **3.5.3 SLC-2W Waste Management**

A waste minimization program has been in effect at SLC-2W since the early 1970s, when the second-stage engine of the Delta I launch vehicle was changed to achieve improved reliability. Since that time, MDA has incorporated waste minimization practices including the following:

- Propellants are captured and recycled from overfill lines. Under normal circumstances, no waste hypergolic propellants are produced during SLC-2W launches.
- Deionized water is used to flush the  $N_2O_4$  system.
- The A-50 system uses a scrubber water catch tank to contain scrubber effluent as industrial wastewater.

- IPS water is captured in a sealed collection pond during a launch operation and disposed of as industrial wastewater.

Other programs to reduce waste in future operations are currently undergoing analysis or implementation. Continuing efforts at SLC-2W are aimed at identifying and implementing alternative materials and processes for assembling and processing of launch vehicles.

Waste minimization efforts are ongoing, as SLC-2W is included in the current VAFB efforts associated with the Hazardous Waste Source Reduction and Management Review Act of 1989 and the generation of the required plans and reports.

As a result of the waste reduction efforts, MDA produces less waste material related to each launch. Roughly two standard 200 liter (55-gallon) drums of waste can be attributed to launch preparation, and the majority of that waste is from spent containers of bonding materials, solvents, and paints. A small percentage of this refuse would be considered hazardous.

#### **3.5.4 Contaminated Soils and Groundwater**

On an ongoing basis, VAFB is publishing studies of contaminated sites on the base, including SLC-2W. A draft phase I characterization, for Site 26 (SLC-2W) (USAF 1996), indicated that the groundwater beneath SLC-2W has high concentrations of TCE. In addition, trace metals were identified in surface soils near the launch pad, although there is an ongoing discussion concerning whether the metals are present at concentrations equivalent to background. The soils having these metals concentrations were identified around the launch pad at SLC-2W. No contamination was identified east of Aero Road. The site is an Installation Restoration Program (IRP) site for which cleanup of contaminants is being evaluated.

The minimum depths to groundwater at the two wells just south of the southern terminus of the road, 25-MW-1 and 25-MW-6, are roughly 6 and 3.7 meters (20 and 12 feet) respectively below ground surface (bgs) (Table 3-8). Figure 3-15 shows the groundwater well locations. This area is reported to have groundwater as shallow as 7 feet bgs. (Bazilwich, 1996).

### **3.6 Socioeconomics**

#### **3.6.1 Population**

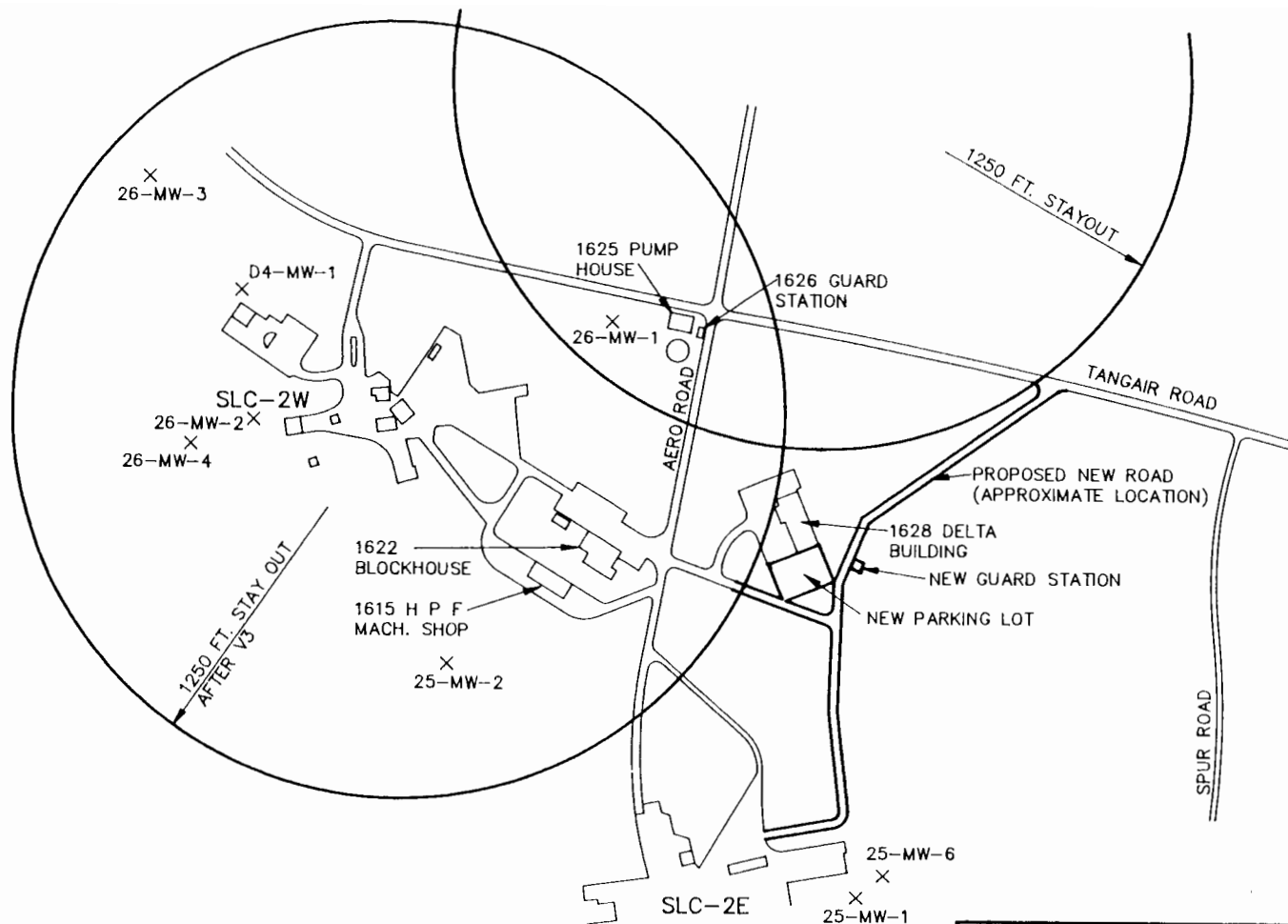
VAFB is located at the western end of Santa Barbara County, California. The approximately 370,000 residents of Santa Barbara County are primarily concentrated along the coast, in communities along U.S. Highway 101. The city of Santa Barbara (population 86,000) in the

**TABLE 3-8**

**Minimum Depth to Groundwater at Monitoring Wells Near SLC-2W**

<b>Monitoring Well ID Number</b>	<b>Minimum Depth to Groundwater (feet below ground surface)</b>
26-MW-1	39
26-MW-2	22
26-MW-3	3
26-MW-4	24
D4-MW-1	128*
25-MW-1	20
25-MW-6	12
* Well drilled to bedrock, distance to first groundwater not noted.	
Source: Ann Bazilwich, VAFB, 30 CES/CEVCR	





<b>ENSR</b>			
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FIGURE 3-15 APPROXIMATE MONITORING WELL LOCATIONS			
Vandenberg Air Force Base Santa Barbara County, California			
DRAWN: M. SCOP	DATE: 1/31/96	PROJECT NO. 4523-125-100	REV.
FILE NO. 4523125a	CHK BY:		

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South County region is the area's largest incorporated community. Santa Maria (population 61,000) and Lompoc (population 38,000) are the principal communities of north Santa Barbara County (USAF 1995).

Overall, the population of Santa Barbara County increased at an approximate 2 percent average annual rate from 1980 to 1988. According to the latest available data, the population in the North County increased by 20 percent between 1980 and 1985, while the South County increased by about 5 percent. Factors influencing the rapid growth of the North County through 1985 include increased activity at VAFB associated with the construction of the Space Shuttle facilities and MX missile testing, growth of the tourist industry, and the influx of population from the South County in response to that area's housing construction limitations and increased housing costs (USAF 1989c). North County population growth has continued, largely due to the development of offshore oil and gas resources. In 1987, oil and gas industry activities brought an additional 2,700 people to Santa Barbara County. More than 80 percent of this oil-related population growth is believed to have occurred in North County communities, including an estimated additional 1,600 people in Lompoc (USAF 1991).

### **3.6.2 Economics/Employment**

Generally, North County employment is concentrated in agriculture, manufacturing, and government, with VAFB being a major economic force. Since 1985, total employment at VAFB has decreased from approximately 16,000 to less than 10,000. Of these 10,000, approximately 68 percent are civilian employees. The base generates about 4,300 jobs for the local economy with VAFB employing approximately 40 percent of Lompoc's labor force and 9 percent of Santa Maria's labor force (USAF 1995).

VAFB's economic impact region consists of the area generally within an 80 km (50 mile) radius of the base and includes much of Santa Barbara and San Luis Obispo Counties. Within North County, VAFB's economic influence centers on the Lompoc and Santa Maria Valleys.

The base has an overall monetary effect of roughly \$500 million on this surrounding region.

### **3.7 Land Use**

Underdeveloped and rural uses largely adjoin the north and east boundaries of VAFB. These areas are dominated by grazing and intensive agriculture, with some scattered oil production activities. To the west, offshore uses are mostly oil production, commercial fishing, marine recreation, and marine transportation. The VAFB shoreline also includes three public beach

parks, one each immediately north and south of VAFB and one at the boundary of North and South VAFB. During launches at VAFB, the beaches are temporarily closed to public access.

The Federal Coastal Zone Management Act of 1972, as amended by Public Law (P.L.) 92-583, implemented by the National Oceanic and Atmospheric Administration, requires that a Coastal Consistency Determination be submitted by the USAF. This document is required to be submitted to the appropriate local agency with coastal jurisdiction. For the state of California, this agency is the CCC. The purpose of the Coastal Consistency Determination is to assure that proposed undertakings by Federal agencies are consistent to the "maximum extent possible" with the state's coastal management program.

### **3.8 Other Environmental Descriptions**

#### **3.8.1 Energy Resources**

The VAFB region is supplied with electrical power by Pacific Gas and Electric Company (PG&E). This power is supplied from an interconnected system that receives input from over 100 power plants located throughout the western United States. Peak demand averages 15,000 megavolt-amperes (MVA) per day.

Government electric energy capacity is substantial and finite and is controlled by the USAF. If commercial activities on VAFB should require the use of government supplies of electric power for processing and launch support operations or emergency backup, allocations would be made based on the U.S. Air Force Prorogations Plan. Additional power is available from commercial sources.

#### **3.8.2 Historic/Cultural Resources**

VAFB is located in an area rich in prehistoric and historic resources. Over 600 archaeological sites representing three prehistoric periods have been discovered on VAFB, and more sites are likely to exist. These sites have been identified by general survey and by specific investigations associated with the construction of the Space Transportation System and MX Missile test and support facilities.

Portions of SLC-2 and the adjacent area have been surveyed on several occasions for cultural resources. Because of the flat terrain, protection from winds, and proximity to the ocean, Purisima Point was the site of a large Chumash settlement. A Phase I surface survey and records check of the site proposed for the new road and parking lot was completed on January 29, 1996. Records searches were conducted at the Southwestern Information Center and

Regional Clearinghouse at the University of California at Santa Barbara and with the base archaeologist at VAFB. The records searches indicated that no previous cultural resources were identified within the project area.

One isolated chert flake was identified during the surface survey. The flake was located at the north end of the new road area, approximately 20 to 30 meters (20 to 30 yards) outside of the road corridor. No other cultural resources were identified during the surface survey.

None of the trailers to be removed was identified as being of historic importance.

### **3.8.3 Aesthetics**

Panoramic views of the beaches and distant hills can be seen from the ocean off the VAFB shoreline and from public-access beaches to the south. The seaside beach and dunes provide a quality visual experience for those who boat along the shore or use the beaches near Purisima Point. The SLC-2 launch facility is not visible from most land areas accessible to the public. Swimming, fishing, and other recreational activities that would require beach access are prohibited along the shoreline for several km north of SLC-2, but public beach access at Ocean Park Beach is allowed along the several km of coastline to the south except during launch events. Public access to the shoreline in the area of SLC-2 is restricted to the open ocean and beach areas to the south.

### **3.8.4 Geologic Resources**

VAFB is located in the middle of the 1,000 square km (400 square-mile) Santa Maria physiographic district. This wedge-shaped district is defined by the northwest-trending San Rafael Mountains, the west-trending Santa Ynez Mountains, and the Pacific coastline. Topography within VAFB is varied, ranging from sea level to about 600 meters (2,000 feet) in the Santa Ynez Mountains. A significant area of VAFB is covered by Quaternary and Holocene age sand dunes. Most of the dunes are stabilized by vegetation, forming a highly irregular ground surface with 10 to 15 meters (30 to 50 feet) of relief. These dunes are still active along their western margin near the beach. SLC-2W is located within an active dune area with well-drained, sandy soils.

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### **3.9 Cumulative Projects**

At present, VAFB has projected 17 space launches during the United States Government fiscal year (FY) 1996 and 14 launches during United States Government FY 1997. Because of the long lead time for preparing missions, roughly half of the missions covered under this EA have been included in this VAFB estimate. Thus, impacts related to launches which would result from other projects would be based on roughly a doubling of the launch rate considered here. However, these other launches would be occurring from facilities as close as Site 576 (approximately 1 ½ km (1 mile) south) to as far away as SLC-6 (approximately 16 km (10 miles) south).

## 4.0 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### 4.1 Air Quality

#### 4.1.1 Impacts from Project Construction

Facility modifications will involve the construction of two roads, a parking lot, and new buildings at SLC-2W. The major equipment related to this construction is shown in Table 2-3. Also shown are the operating hours of the construction equipment. In addition to the engine exhaust from construction activities, there are also fugitive dust emissions during construction activities and emissions of reactive organic gases (ROG) from the asphalt during the paving process. Construction emissions are summarized in Table 4-1. Appendix B presents the calculation of the various emission components.

**TABLE 4-1**

#### Construction Emissions Summary

Construction Activity	Emissions (Tons) <sup>a</sup>				
	NO <sub>x</sub>	VOC <sup>b</sup>	CO	PM <sub>10</sub>	SO <sub>x</sub>
Equipment Exhaust	0.78	0.49	9.86	0.06	0.06
Fugitive Dust <sup>c</sup>	--	--	--	0.67	--
Asphalt Paving <sup>d</sup>	--	0.05	--	--	--
<b>TOTAL</b>	<b>0.78</b>	<b>0.54</b>	<b>9.86</b>	<b>0.73</b>	<b>0.06</b>
a. To convert tons to metric tons, multiply tons by 1.1 b. VOC assumed to be equivalent to ROG c. PM <sub>10</sub> emissions only d. ROG emissions only					
Source: MDA					

The SBCAPCD has not established significance criteria for emissions associated with road construction. However, SBCAPCD Rule 202(C)(3) provides an emission threshold of 25 tons of each pollutant in a 12-month period for emissions from equipment used to construct a "stationary source." Because there are no other criteria upon which to judge the significance of all of the project's construction activities, the Rule 202(C)(3) threshold will be used. This represents a

conservative assessment. Based on this comparison, the construction impacts are not significant, because the total project construction emissions are less than 25 tons for each pollutant.

#### 4.1.2 Impacts from Launch Exhausts

The current expendable launch vehicles (ELVs) are powered by chemical boosters. These boosters operate by the combustion of a fuel and an oxidizer. Emissions of air pollutants may result from pre-launch, launch, and postlaunch activities. Rare on-pad or in-flight accidents are a source of emissions. In normal operations, the major source of air pollutants will be produced by the nine SRMs and the Delta II main engine during launch. Of these emissions, particulate aluminum oxide ( $\text{Al}_2\text{O}_3$ ), hydrochloric acid (HCl), and CO are potentially of concern.

##### 4.1.2.1 Delta II Exhaust Emissions

Six SRMs are ground-started, along with the main engine, and the remaining three SRMs are started in the air, approximately 1 minute into the flight. Exhaust emissions associated with the launching of the Delta II include  $\text{Al}_2\text{O}_3$  particles, CO, and HCl. Carbon dioxide ( $\text{CO}_2$ ) emissions, which are a concern as a greenhouse gas, are also produced in relatively large quantities.

The estimated emissions from a single Delta II launch are summarized in Table 4-2. Emissions are estimated for the lower troposphere and the stratosphere.

**TABLE 4-2**  
**Delta Launch Vehicle Emissions<sup>a</sup>**  
**(pounds per launch)<sup>b</sup>**

Altitude range	$\text{Al}_2\text{O}_3$	HCl	CO	$\text{CO}_2$
<3,000 feet <sup>c</sup>	13,801	7,447	15,175	5,748
15 - 50 km <sup>d</sup>	23,120	12,476	38,141	18,494
<p>a. SRMs plus Main Engine  b. To convert pounds to kilograms, multiply pounds times 2.2  c. Lower troposphere  d. Stratosphere</p>				
Source: MDA				

The top of the lower troposphere at Vandenberg was determined from data on afternoon mixing heights. According to an EPA report (Holzworth 1972), the average annual afternoon mixing height at Vandenberg is somewhat less than ( $<$ ) 3,000 feet ( $<$ 900 m). The heights of the top and bottom of the stratosphere are commonly taken as 50 km and 15 km, respectively (see, for example, AIAA 1991). Emissions in other layers of the atmosphere are not expected to impact surface concentrations or to negatively affect the stratosphere. Since the Delta launch vehicle reaches an altitude of 3,000 feet in about 17 seconds, the launch emissions in the lower troposphere result from the six ground-started SRMs and the main engine. The ground-started SRMs burn out about the time the Delta vehicle enters the stratosphere. Therefore, emissions in the stratosphere result mainly from the three air-started SRMs, which ignite in the lower stratosphere, and the main engine. The air-started SRMs burn out in the upper stratosphere, while the main engine continues to burn for about 120 seconds after emerging from the stratosphere. The secondary engine starts at an altitude of about 125 km; since this is well above the stratosphere, these emissions are not considered.

#### **4.1.2.2 Ambient Impacts**

During a launch, the exhaust products are not released at a single point, but are distributed along the vehicle trajectory. For reference, the Delta II ignites six SRMs on the ground and at approximately 20 seconds is at an altitude of 1,500 meters (5,000 feet). The remaining three SRMs ignite at an altitude of approximately 18 km (60,000 feet) (see Section 2.1.2). Due to the acceleration of the vehicle and the staging process, the quantities emitted per unit length of trajectory are greatest at ground level and decrease continuously with altitude.

Diffusion models have been developed for the Titan missile program to calculate ground-level concentrations of various pollutants present in ground clouds at launch (USAF 1990). This information can be used to estimate Delta impacts by a conservative scaling of the results by 0.4 since the ground-started Delta SRMs contain much less than 40 percent of the propellant that the Titan's ground-started SRMs contain. A comparison of the solid rocket propellant weights by launch vehicle is shown in Table 4-3. This chart compares the total quantities of solid rocket motor propellants each vehicle contains.

Based on the Titan calculations, maximum 1-hour HCl concentrations beyond the distance of the nearest VAFB property boundary for all meteorological scenarios are estimated to be well below the National Research Council (NRC) recommended 1-hour average short-term public emergency guideline (SPEGL) of 1 ppm (MDA 1993). The NRC recommends that 1-hour average HCl concentrations "in connection with community exposure during space-shuttle launches" not exceed a level of 1 ppm.



TABLE 4-3

Solid Rocket Propellant Comparison Weights by Launch Vehicle\*

Vehicle Type	Each SRM Propellant Quantity in Pounds	Quantity Type SRM	Total Weight (Pounds) <sup>a</sup>	Reference
Titan IV SRMU	680,394	2 Ground Start	1,360,788	USAF 1989a
Titan IV SRM	591,692	2 Ground Start	1,183,384	TITAN IV EA
Delta II	25,807	6 Ground Start 3 Altitude Start	154,842 77,421	MDA MDA
<p>* All vehicles have additional solid or liquid stages that ignite higher in the atmosphere or in space for payload orbit insertion and are not included. The next sequenced altitude start motors are included for reference only.</p> <p><sup>a</sup> To convert pounds to metric tons multiply pounds times <math>4.54 \times 10^{-4}</math> (0.000454)</p>				
Source: MDA				

The current OSHA Permissible Exposure Limit (PEL - 8-hour time-weighted average) is 5 ppm. The ground cloud persists for only a few minutes after ignition and is concentrated in the immediate pad area (Applied Biology 1980). Exposure of the general population to potentially harmful concentrations of HCl is not anticipated.

Using the same modeling techniques, it has been predicted that levels of CO would not exceed the NAAQS 8-hour time-weighted average (10 milligrams per cubic meter [ $\text{mg}/\text{m}^3$ ]) except for brief periods during liftoff (NASA, 1993). CO levels were predicted not to exceed the NAAQS of 35 ppm (1-hour average) average outside of the launch complex. Thus, exposure of the general population to levels of CO which exceed NAAQS standards is not anticipated.

Similarly, based on conservative scaling of Titan impacts,  $\text{Al}_2\text{O}_3$  levels should not exceed  $11 \text{ mg}/\text{m}^3$  (<15-minute average) at a distance of 4.8 km (3 miles) from the launch site. At this distance, which is well short of the distance to the VAFB fenceline (11.6 km [7.2 miles]) or to base housing (7.2 km [4.5 miles]),  $\text{Al}_2\text{O}_3$  levels were predicted to be less than the NAAQS for  $\text{PM}_{10}$  ( $0.15 \text{ mg}/\text{m}^3$ , 24-hour average) because of the brief, intermittent nature of launch events.

The manufacturer of the SRMs (Alliant 1996) has indicated that 86 percent of the  $\text{Al}_2\text{O}_3$  particles are less than or equal to 10 microns in diameter at the nozzle. This is believed to be a conservative estimate of the  $\text{PM}_{10}$  fraction because there is believed to be substantial

recombustion of the fine particles within the exhaust plume to create particles longer than 10 microns.

During Delta II launches, water is used for IPS on the main engine to reduce the initial shock wave of the motor exhaust gasses down the flame duct. This configuration is different from that used by the Titan, which uses a water curtain through which the exhausts of both solid and liquid engines pass. In the Titan, a large acid mist is produced from the interaction of the exhaust of the solid motors and the water. No such acid mist is formed by the Delta since the solid motor exhausts do not contact the IPS water during the launch. Deposition of HCl is limited to the area under the rocket itself and the HCl does not disperse widely such as occurs with the Titan.

In the event of a vehicle failure in flight, the vehicle destruct system typically ruptures the propellant tanks and releases all remaining propellants. The propellants will normally ignite and burn; however, only limited information is available concerning the products formed or the extent to which the propellants are consumed.

Impacts from the launches are limited to insignificant, short-term effects which have been analyzed in earlier EAs. As launches are infrequent (i.e., average less than one per month) and because of the short duration of the air quality impacts (i.e., less than an hour), there will be no significant direct or cumulative impacts on air quality from increasing the number of launches to 10 per year. As a result, the addition of eight Delta II launches annually from SLC-2W will result in no increased impacts to air quality.

#### **4.1.2.3 Impact on Terrestrial Fauna and Flora**

It is expected that air pollutant emissions from each additional launch may result in insignificant, short-term impacts to terrestrial fauna in the immediate area of the launch point. Discussion of these impacts is presented in Section 4.4.1. No significant impacts to terrestrial flora are expected to occur.

#### **4.1.3 Impacts from Ancillary Activities**

In addition to the direct emissions from the launch vehicle presented in Section 4.1.2, there are also indirect emissions from ancillary activities. These activities include:

- transport of the various components of the launch vehicle from their respective manufacturing and assembly points (see Section 2.3.1.2) to SLC-2W;
- use of solvents and paints; and

- additional worker commuter traffic.

The annual indirect emissions associated with eight additional Delta II launches per year are summarized in Table 4-4. The calculations for these emissions are provided in Appendix C.

**TABLE 4-4**  
**Project Indirect Emissions Summary <sup>a</sup>**

Activity	Annual Emissions (Tons) <sup>b</sup>				
	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>	SO <sub>x</sub>
Transport to SLC-2W <sup>c</sup>	0.116	0.016	0.064	0.020	0.004
Solvent and Paint Usage	--	0.34	--	--	--
Worker Commuting <sup>d</sup>	0.34	0.51	3.68	0.05	0.03
<b>TOTAL</b>	<b>0.46</b>	<b>0.87</b>	<b>3.74</b>	<b>0.07</b>	<b>0.03</b>
<b>a. Eight additional launches per year</b> <b>b. To convert tons to metric tons, multiply tons by 1.1</b> <b>c. Within Santa Barbara County</b> <b>d. Based on 250 work days per year</b>					
Source: ENSR					

#### 4.1.4 Summary of Delta II Project Emissions

Table 4-5 provides a summary of the criteria pollutant emissions from the proposed project. The annual emissions are based on eight additional launches per year and represent the launch emissions that occur up to a height of 3,000 feet, which is the layer in which VAFB launch emissions typically affect surface air quality. CO and PM<sub>10</sub> are the only criteria pollutants that are emitted in substantial amounts from launches.

#### 4.1.5 Clean Air Act Conformity Determination

The CAA as amended in 1990 requires Federal actions to conform to any State Implementation Plan approved or promulgated under Section 110 the Act. The final rule, 40 CFR 51 Subpart W, specifies requirements for general conformity analyses in nonattainment areas. The SBCAPCD adopted Rule 702, taken verbatim from Subpart W except §51.860, in October 1994 to address General Conformity.

TABLE 4-5

Summary of Delta II Project Emissions<sup>a</sup>

Constituent	Total Annual Launch Emissions <sup>b</sup> (tons) <sup>c</sup>	Total Annual Indirect Emissions (tons)	Total Annual Project Emissions (tons)
PM <sub>10</sub>	47.48 <sup>d</sup>	0.07	47.55
CO	60.7	3.74	64.4
NO <sub>x</sub>	0.22	0.46	0.68
VOC	--	0.87	0.87
SO <sub>2</sub>	--	0.03	0.03

a. Based on eight additional launches per year.  
 b. Negligible launch emissions of VOC and SO<sub>2</sub>.  
 c. To convert tons to metric tons, multiply tons by 1.1  
 d. Assuming 86% of Al<sub>2</sub>O<sub>3</sub> is PM<sub>10</sub>.

Source: MDA, ENSR

Table 4-6 shows the *de minimis* emission levels applicable to VAFB. Because Santa Barbara County is attainment for all pollutants except ozone, conformity determination only applies to ROG and NO<sub>x</sub>. Moreover, since Santa Barbara County is a moderate nonattainment area for ozone and is outside the ozone transport region, the *de minimis* threshold for both ROG and NO<sub>x</sub> is 100 tons per year. This table also restates the estimated ROG and NO<sub>x</sub> emissions associated with the proposed Delta II project. A trace amount of NO<sub>x</sub> is emitted by the SRMs, but the launches do not emit ROG in quantifiable amounts. Both ROG and NO<sub>x</sub> are emitted from the ancillary activities, although these emissions are relatively small. As a result, neither ROG or NO<sub>x</sub> will be emitted in an amount greater than the corresponding *de minimis* threshold. An additional Subpart W requirement, from 40 CFR 51.853(i), is that it must be shown that the ROG and NO<sub>x</sub> emissions are not regionally significant. This done by demonstrating that the emissions are less than 10 percent of the latest regional emission inventory. This comparison is also made in Table 4-6, which shows that the project-related emissions increases are much less than 10 percent of the current regional emissions. Therefore, the requirements of a conformity analysis are not applicable to this project.

#### 4.1.6 Cumulative Impacts

Based on the infrequency of launch activities proposed for the action and the short-term nature of the construction activities when considered in conjunction with both other launches and other construction projects on base, no cumulative impacts to air quality are anticipated to occur from the proposed action.

**TABLE 4-6**
**Clean Air Act Conformity Comparison**

Constituent	Total Annual Project Emissions (tons) <sup>a</sup>	De minimis Emission Levels <sup>b</sup> (tons/year)	Ten Percent of 1996 Regional Emissions <sup>c</sup> (tons/year)
NO <sub>x</sub>	0.68	100	2160
ROG <sup>d</sup>	0.87	100	5001

a. To convert tons to metric tons, multiply tons times 1.1

b. Santa Barbara County is moderate nonattainment for ozone and outside the ozone transport region. Therefore, the *de minimis* threshold for NO<sub>x</sub> and VOC is 100 tons/year.

c. From 1994 Clean Air Plan for Santa Barbara County--1996 Projection. Includes Outer Continental Shelf emissions.

d. For project emissions, ROG assumed to equal VOC.

Source: ENSR and SBCAPCD

The cumulative annual emissions of 10 Delta II launches per year, which includes the current two launches per year plus the eight additional from the proposed action, are shown in Table 4-7.

**TABLE 4-7**
**Cumulative Delta II Project Emissions<sup>a</sup>**

Constituent	Total Annual Launch Emissions <sup>b</sup> (tons) <sup>c</sup>	Total Annual Indirect Emissions (tons)	Total Annual Project Emissions (tons)
PM <sub>10</sub>	59.3	0.08	59.4
CO	75.9	3.76	79.7
NO <sub>x</sub>	0.27	0.49	0.76
VOC	--	0.89	0.89
SO <sub>2</sub>	--	0.04	0.04

a. Based on 10 launches per year.

b. Negligible launch emissions of VOC and SO<sub>2</sub>.

c. To convert to metric tons, multiply by 1.1

The 1994 Clean Air Plan (SBCAPCD 1994) has no growth allotment for missile launch emissions between 1990 and 1996. However, the 1994 Regional Growth Forecast produced by the Santa Barbara County Association of Governments (SBCAG) does allow for an increase in post-1995 commercial launches at VAFB (SBCAG 1994). Since emission growth factors are based on information in the SBCAG forecasts, future updates to the Clean Air Plan will include an allowance for increases in missile launches. Therefore, the project will be consistent with growth factors in future updates to the Clean Air Plan. As a result, the cumulative impacts are not significant.

#### **4.1.7 No Project Alternative**

With the no project alternative, there will be no changes to air emissions beyond those currently occurring. Therefore, the no project alternative would produce no significant impacts to air quality.

### **4.2 Water Resources**

#### **4.2.1 Water Quantity**

This section considers water use and supply during construction of the proposed action and during Delta II launches.

##### **4.2.1.1 Construction**

Water will be required during road construction for compaction of the roadbase and periodic watering for dust suppression. Very little additional water will be required for construction workers during the 20-day construction phase as the contractor will supply bottled water and portable sanitary facilities.

A conservative estimate of water use for compaction can be determined by assuming a road of roughly 670 meters (2,200 feet) in length and 6.1 meters (20 feet) in width and a parking lot 60 meters (200 feet) wide by 90 meters (300 feet) long, a compaction depth of 30 centimeters (1 foot), and a water use ratio of 115 liters per cubic meter (30 gallons/cubic yard) of compacted soils. Based on these figures, roughly 435,000 liters (115,000 gallons) of water would be required for compaction. Assuming another 7,500 liters (2,000 gallons) per day for 20 days would be used for dust control, the total water use would be approximately 585,000 liters

(155,000 gallons) of water over the duration of the construction or roughly 29,000 liters (7,750 gallons) per day. This water use represents less than 0.2 percent of the daily water use or less than 0.01 percent of annual water use at VAFB.

Based on this small incremental increase in water use and its short duration, it is assumed that the construction of the new facilities will not significantly affect the quantity of water available to VAFB or the surrounding community.

#### **4.2.1.2 Launches**

Water use will increase both from additional consumption/use by workers at the site as well as from the use of additional IPS water. Current operations require a core staff of roughly 60 people. To accommodate the additional launches, up to 110 additional people would be working onsite. Based on the assumption that each worker consumes 57 liters (15 gallons) of water per day (USAF 1993) and the conservative assumption that each worker works 6 days per week for 50 weeks per year, full operations at SLC-2W would require the use of approximately 1.87 million liters (495,000 gallons) of additional potable water annually.

Each launch requires between 95,000 and 132,000 liters (25,000 and 35,000 gallons) of water for IPS and pad washdown purposes. With the addition of eight launches, the SLC-2W water usage will increase by as much as 1.06 million liters (280,000 gallons) annually for IPS and pad washdown usage. Thus, total annual increased water use at SLC-2W during operations could be as much as 2.9 million liters (775,000 gallons). Total annual water use on VAFB is approximately 5.3 billion liters (1.4 billion gallons) (USAF 1989a), which is equivalent to 14.5 million liters (3.84 million gallons) per day. An annual increase in demand of 2.9 million liters (775,000 gallons) would represent less than 0.0006 percent of total demand or roughly 1/20 of one percent annually or 0.9 percent of total daily use of water. Based on this small incremental increase, it is assumed that the proposed action would not significantly affect the quantity of water available to VAFB or the surrounding community.

Since no surface water is used for the operation of SLC-2W, the action will have no impact on the quantity of surface water available.

#### **4.2.2 Water Quality**

This section discusses the potential for impacts to water quality from the proposed action during construction and Delta II launches.

#### **4.2.2.1 Construction**

The site is relatively flat and comprised of sandy soils. Water used during construction will be limited to that necessary for soil compaction and dust suppression. Therefore, because only a small amount of water will be used during construction, no significant impacts will occur. Incident rainfall is expected to soak into the ground readily yielding no effect on surface water quality. Total area of construction will be less than 3 acres; therefore, a construction stormwater pollution prevention plan is not required for this project.

#### **4.2.2.2 Launches**

Water quality may be affected by the increase in launches in any of the six ways discussed in the 1991 EA for SLC-2W modifications. Those six ways are:

- Sanitary wastewater discharge,
- IPS water discharge,
- Contamination of surface waters by the exhaust cloud,
- Discharge of stormwater runoff from the retention basin holding IPS water,
- On-pad accidents and propellant spills, and
- In-flight failures resulting in propellant falling in nearby surface waters or the ocean.

#### Sanitary Wastewater

At the current level of operation, the SLC-2W facility generates sanitary wastewater at a rate of roughly 3,400 liters (900 gallons) per day. This estimate is based on 57 liters (15 gallons) being used per person per day (USAF 1993) for a core staff of 60 employees. To accommodate the additional 110 employees that would be onsite annually, discharges of wastewater would increase by 6,250 liters (1,650 gallons) per day. This total level of discharge is less than or equivalent to levels sustained in the 1970s when the facility was operating at its peak.

Sanitary wastewater is discharged to a septic tank, the contents of which are periodically pumped out and trucked to an offsite disposal facility. When the facility was originally constructed, the wastewater treatment and disposal systems were designed for a larger number of workers than required for the present project. Similarly, the removal/disposal systems have been constructed to handle the waste load consistent with the increased activity. Since the project will not exceed the design capacity for wastewater and the total estimated volume remains relatively small, there will be no significant impact from the increased generation of wastewater due to this project (Bert Johnson, 1996).



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### Ignition Pulse Suppression and Pad Washdown Water

IPS and pad washdown water is captured in a sealed retention basin, and tested prior to disposal as an industrial wastewater at the SLC-6 treatment plant. IPS water collected during Delta II launches at VAFB (November 1989) was determined to be non-hazardous and contained only small amounts of trace metals but no detectable concentrations of purgeable organics (Appendix D). Based on this experience, the spent IPS water from future launches is expected to continue to be classified as industrial wastewater.

Under normal conditions, the VAFB water treatment plant at SLC-6 has ample capacity for handling the roughly 130,000 liters (35,000 gallons) of industrial wastewater that would require disposal from SLC-2W approximately every 1 to 2 months. Because of the non-hazardous nature of the water and the facilities in place for handling the solutions, disposal of the water was not identified as a significant issue in the 1991 EA for SLC-2W. For the same reasons, the increased number of launchings will again not pose a potential significant impact to water resources.

The Industrial Wastewater Treatment Plant Evaporation Pond filled to overflowing in 1994-1995 and nearly again in 1995-1996 due to wastewater deliveries and rainwater contributions. In the unlikely event that the wastewater ponds are filled at the time of a launch, the IPS water will be retained until sufficient capacity is available in the evaporation ponds. If this option proves infeasible, alternative disposal options will be arranged through the 30 CES/CEVCC (Environmental Compliance Office). Alternative disposal options may include offsite disposal through a private contractor. In the future onsite treatment and the use of the water may be a viable option. The USAF is exploring options through its ENVEST program for reclamation and the use of industrial wastewater (J. Erickson, 1996).

### Exhaust Cloud

Launches of the Titan rocket have been the basis for many of the models of launch emissions and the conclusions of the resulting impacts. As compared to the Titan, the Delta II does not produce an acid mist as a part of its exhaust cloud. HCl is released from the SRMs as they rise, but the deposition is concentrated near the pad. The acid is not expected to travel more than several hundred meters (or yards) laterally. The nearest ocean water is roughly 1,000 meters (or yards) from the launch pad and the nearest freshwater body is over 3 km (2 miles) to the north. Thus, acid mist is not expected to directly affect any surface water bodies.

Other constituents of the exhaust cloud would be limited to carbon dioxide and water with small amounts of aluminum oxides and trace amounts of aluminum chlorides. As discussed in Section

3.5.4, some trace metals have been identified in surface soils near the pad. However, there is still uncertainty whether these metals constitute background metals or were derived from launch activities. Based on the lack of substantial accumulation of metals and other surface contaminants, it is assumed that they are neither deposited in appreciable amounts nor accumulate over time. The lack of high concentrations of metals downgradient of the pad suggests no long term accumulation of such contaminants offsite. Consistent with the 1991 EA for SLC-2W, there is expected to be no impact to surface water resources due to the various constituents of the exhaust cloud.

#### Accidental Releases

The potential is remote that an accidental release of IPS water will result from rain overflowing the retention basin when it contains IPS water. The retention pond is maintained essentially empty, and is emptied prior to a launch. Following a launch, IPS water is retained in the pond for as short a time as feasible and only so it can be tested for proper disposal. In the event that a substantial rain event occurs prior to the routine time frame for disposal of IPS water, the testing will be expedited and the water disposed of before large amounts of rain accumulate.

If an upset condition were to exist, spills on the launch pad or releases to adjacent areas could occur. Spills on the pad would be contained onsite. The VAFB HAZMAT team is expected to be able to respond efficiently and effectively to any spill at the pad. The increased potential for a spill is not expected to result in a significant increase in risk of an injury resulting from a spill.

Because the flight trajectories take the rocket offshore, releases offsite resulting from a catastrophic destruction of a rocket would not be expected to land on freshwater resources. Such releases to the ocean would be expected to yield rapid localized reactions, but no significant or long-term effects due to the buffering and diluting capabilities of the ocean water. Increasing the number of launches will cause the mathematical potential for an accident to increase by a factor of five. However, based on the demonstrated high reliability of the Delta II and the positive control during flight by the VAFB Range Safety Officer, increasing the number of launches is not expected to increase the potential for accidental releases.

#### Groundwater

In the event that long periods separate successive launches, i.e., 6 months or more, the IPS system may require functional checks. Since potable water would be used for such a check and no contaminants will be added to the water, the water used will be retained and discharged to an unlined percolation pond onsite. No other discharge to groundwater will result from the

project. Based on a lack of an expected change to groundwater, no impacts to this resource are anticipated.

#### **4.2.3 Cumulative Impacts**

Because increased water use from the proposed action is relatively low and represents a minor portion of available water, particularly in light of current levels of water use from other activities on VAFB, no significant cumulative impacts are expected to result from either the construction or operation of the proposed action.

#### **4.2.4 No Project Alternative**

With this alternative, there will be no increase in water use for operations beyond that currently being consumed. In addition, there will be no water use during construction. Finally, there will be no change in water quality from current conditions. Based on these considerations, the no project alternative would yield no significant impact to water resources.

### **4.3 Noise**

Project-related impacts from noise can occur primarily from two sources: construction activities and launches. Daily operations at SLC-2W do not generate significant amounts of noise relative to the normal background noise typical of a seashore dune area. The increased activity with the additional launches is not anticipated to significantly change this minimal noise production.

#### **4.3.1 Construction Noise**

Noise from construction of the road and parking lot and the replacement of the trailers is expected to be of relatively short duration and well removed from most other activities at SLC-2W. No residential uses, schools, or other public facilities are located near SLC-2W. The lack of significant human receptors likely to be affected by the construction means that there will be no significant impact on people from the construction activities at the site.

Because the site is in close proximity to the least tern and snowy plover nesting sites, the sustained construction noise could affect the birds if they were unfamiliar with it and if they could hear it above background. Ambient noise levels at Purisima Point as measured before a Taurus rocket launch by Stewart et al. (1994) varied between 48 and 62 dB, mostly due to wind and surf. Time waited averages were in the low to mid 50 dB range.

Construction noises from a typical construction equipment have been estimated by the (EPA, 1971). Most have a noise emission level at 15 meters (50 feet) of 88 dBA or less. The formula used for estimating divergence attenuation is (Harris 1979):

$$L = L_{ref} - 20 \log_{10} (r/r_{ref}) \text{ dBA}$$

where:

$L_{ref}$  = known sound pressure level in decibels

(A-weighted sound at a reference distance  $r_{ref}$ )

$L$  = sound pressure level in decibels (A-weighted) at any other distance "r".

Using this formula and the noise emission level of 90 dBA, least terns located roughly 900 meters (3,000 feet) away would experience roughly 55 dBA from the construction. Given the background noise on a normal day is of this same order of magnitude, it is unlikely that the least terns or snowy plovers would be able to discern the noise from the construction activities. This assumption is further supported by the understanding that the predicted attenuation assumed a straightline loss of sound energy. No loss due to surrounding was assumed. Given the presence of the dunes and vegetation, there is no likelihood that the listed birds would be affected by construction noise.

### **4.3.2 Launch Noise**

The origin, magnitude, and frequencies of launch noises, including sonic booms, are discussed in the following sections. The potential impacts that these noises can have to humans is discussed in Section 4.3.2.5. The potential impacts of noise on biotic resources is considered in detail in Section 4.4.2.

#### **4.3.2.1 Origin**

Launches are the major source of noise from SLC-2W; all other noise sources in the launch area are considered minor compared to launch noise. However, launch noise is relatively brief, i.e., less than 20 seconds above 100 dBA, and, infrequent, less than once per month.

Typically, noise is generated by four mechanisms: 1) combustion noise radiating from the rocket motor chambers, 2) jet noise generated by the interaction of the exhaust jet and the atmosphere, 3) combustion noise from post burning of the fuel-rich combustion products exhausted into the atmosphere, and 4) sonic booms associated with the high velocity of the launch vehicle. The initial loud, low-frequency noise heard in the immediate vicinity of the launch pad is a result of

the first three types of noise combined. Sonic booms may be generated as the vehicle accelerates to a very high speed. Sonic booms are the result of flight in excess of the speed of sound, which results in very short duration impulses to the atmosphere. The intensity of the sonic booms are a function of the vehicle size, its configuration, and its speed. Generally, sonic booms resulting from the vehicles ascending from VAFB occur downrange from the coastline, and, depending upon the trajectory, may cross the Channel Islands.

#### **4.3.2.2 Predicted/Measured Noise Levels**

Rocket launch noise was recorded during the Taurus launch from Site 576E on March 13, 1994, the data were analyzed to estimate sound levels at several sites near the launch pad. Launch noise was also measured for a Delta II mission flown from CCAS on July 7, 1992 (McInerny 1993). The sound levels predicted for both the Taurus and Delta II launches are plotted in Figure 4-1. Both unweighted and A-weighted noise levels were comparable for the two rockets. Noise data collected from the November 4, 1995 Delta II launch from VAFB, are undergoing evaluation but are comparable to the CCAS Delta II launch.

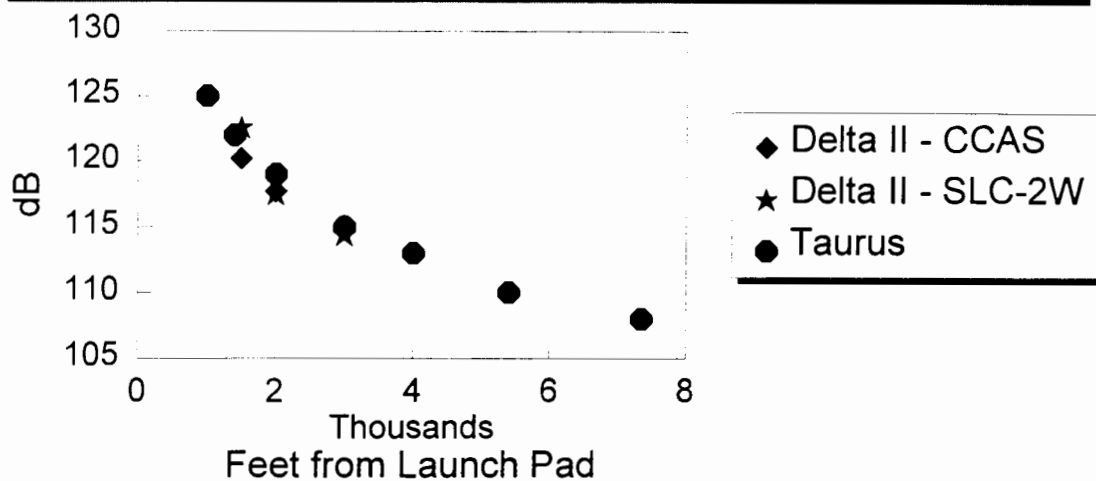
Based on the existing Delta II data as well as data extrapolated from the Taurus launch, noise levels at the coast, roughly 900 meters (3,000 feet) away, would be around 115 dBA weighted (129 dB unweighted). Noise at Purisima Point, roughly 1,500 meters (5,000 feet) away, would be around 110 dB A-weighted (125 dB unweighted).

Noise measurements have been predicted and recorded for a number of other rocket launches. Titan III launches produced a maximum of 104 to 118 dB in the VAFB cantonment area, Vandenberg Village, and Lompoc residential areas roughly 5 to 7 km (3 to 4 miles) away. The residential areas on VAFB are roughly the same distance from SLC-2W, while Lompoc is roughly twice as far. Predicted noise level contours for Minuteman missile launches from a typical North VAFB coastal site were identified with maximum measurements of 124 dB at 2.9 km (1.8 miles) from the launch site and in the direct flight path. Additional noise levels were identified as 99 dB at 4.2 km (2.6 miles), 80 dB at 12.6 km (7.9 miles), and 74 dB at 16.6 km (10.4 miles). Predicted noise levels for Atlas IIAS and Atlas IIA rockets 1 ½ km (1 mile) from the launch site are 127.5 dB and 126.1 dB, respectively (USAF 1991). Noise data from a Peacekeeper missile launched from Vandenberg on June 30, 1992 indicated a maximum calculated overall sound pressure level of 125.7 dB at 1200 meters (4,000 feet) from the launch pad. These noise levels are expected to be comparable to or higher than those for Delta II.

The sound level of the Delta II launch vehicle at VAFB is expected to be no more than the sound level from the monitored CCAS launch. It is anticipated that some attenuation will occur for ground and wind effects since there is considerably more topographic relief at VAFB than CCAS.

# Launch Noises - Delta II and Taurus

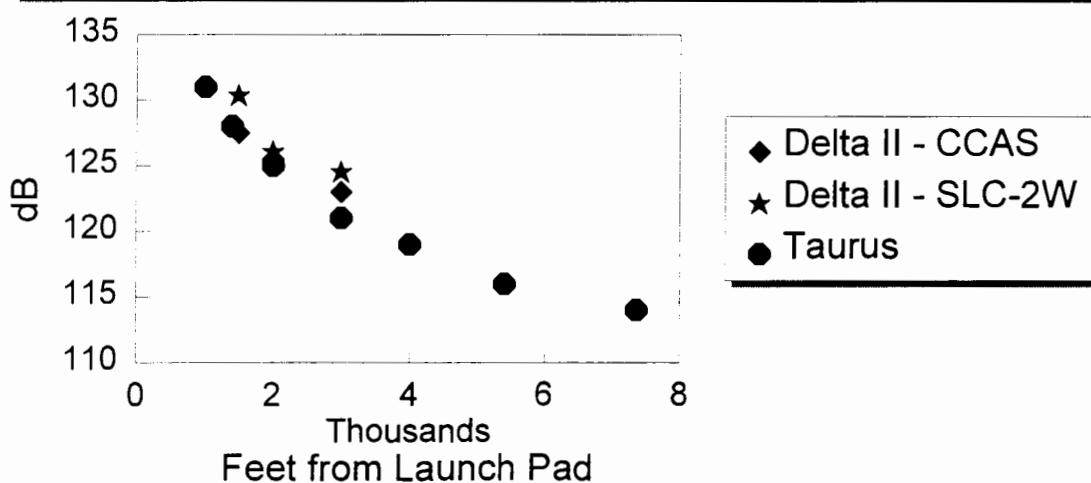
OASPL - A-weighted



OASPL = Overall Sound Pressure Level

# Launch Noises - Delta II and Taurus

SEL - A-weighted



SEL = Sound Exposure Level

FIGURE 4-1. Launch Noises - Delta II and Taurus

#### **4.3.2.3 Frequencies**

Sounds associated with launches occur over a wide range of frequencies from less than 1 hertz (Hz) to over 100,000 Hz. Peak intensities typically occur around the 100 Hz range for unweighted measurements and the 1,000 Hz range for A-weighted measurements. Figure 4-2 shows noise frequencies at 900 meters (3,000 feet) from a Delta launch.

#### **4.3.2.4 Sonic Booms**

During the ascent, the rocket will generate a sonic boom. However, in contrast to launches from other locations on VAFB, several factors combine to minimize the potential for sonic booms to affect the birds and marine mammals on the northern Channel Islands.

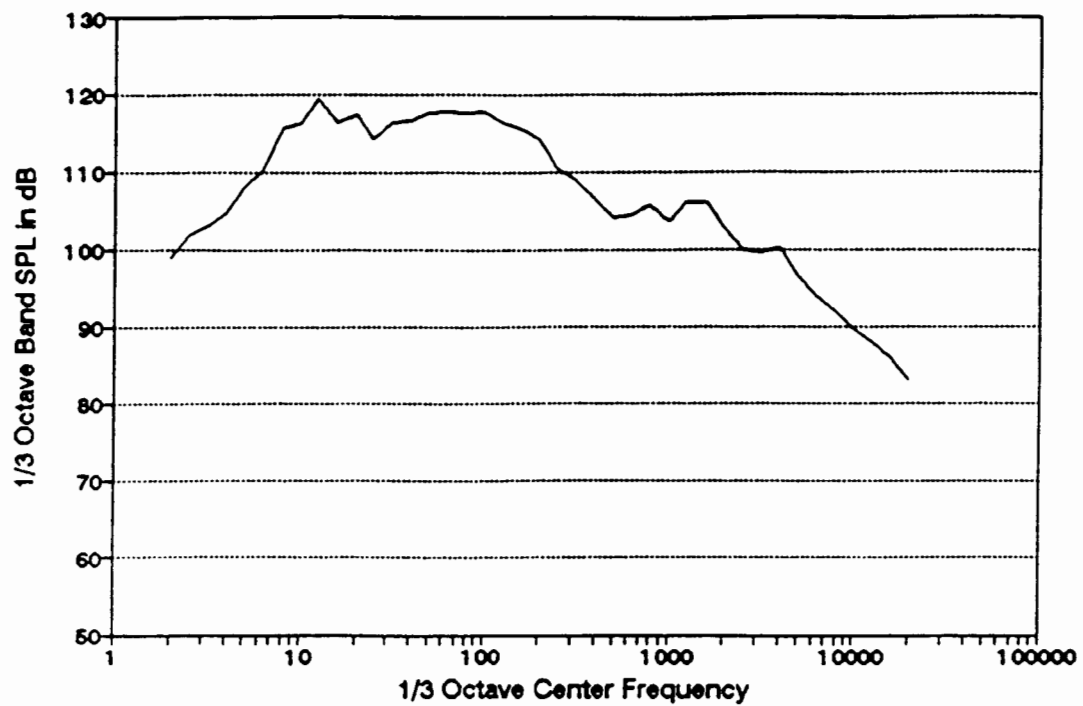
- The location of SLC-2W relative to other launch complexes and nearby land masses as well as the presence of offshore platforms requires that rockets are directed slightly west and then redirected to a more southerly direction. The result is that missions track roughly a 196° azimuth. This tracking keeps rockets well west of the northern Channel Islands.
- SLC-2W is located roughly 16 km (10 miles) north of SLC-6, the site of most modeling efforts to determine the effects of sonic booms. This additional distance means that the focus of the sonic boom, when it occurs, will be farther away from the northern Channel Islands as compared to those modeled for SLC-6.

No data are presently available on measured levels of Delta II rocket sounds at the Channel Islands. However, because the footprints of the focused sonic boom will occur well west of the Channel Island, the noise from the sonic boom at sea level will likely be only slightly louder than background noises caused by wind and surf. As a result, there is expected to be no impact to marine mammals on the Channel Islands from Delta II launches from SLC-2W.

#### **4.3.2.5 Impacts to Humans**

The EPA and the USAF Aerospace Medical Research Laboratory indicate that short-term exposure to about 130 dB presents no serious health problems, but some annoyance is to be expected (USAF 1989b).

In recent years there have been no complaints recorded concerning noise produced by missile launches. The lack of complaints can be attributed, but not limited, to the infrequency of launches and the low annoyance level of rocket motor firings. This proposal for additional Delta



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FIGURE 4-2  
NOISE FREQUENCIES FROM DELTA LAUNCH  
AT 3,000 FEET (McINERNEY 1993)

DRAWN: M. SCOP	DATE: 7/5/95	CHK BY: <i>LE</i>	REV.
FILE NO: 4523085G			4523-125-100



II launches is not expected to significantly increase the noise levels and the number of launches annually from North VAFB and the SLC-2 area. Based on this information, the increased noise resulting from the proposed action will not cause significant adverse impact to humans.

#### **4.3.2.6 Impact on Biota**

Launch noise impacts are considered to be the primary source of project impacts to biological resources. These potential impacts are discussed in Section 4.4.

#### **4.3.3 Cumulative Impacts**

Because launch noises are periodic and of short duration, it is expected that no impacts will occur to human receptors as a result of this project when considered cumulatively with other rocket launch programs. Cumulative noise impacts on biota resulting from this project are considered in Section 4.4.

#### **4.3.4 No Project Alternative**

With this alternative, there will be no change in exposure of humans to noises relative to current levels; therefore, there would be no significant impact from this alternative. Potential effects on biota are considered in Section 4.4.5.

### **4.4 Biotic Resources**

Impacts to biological resources could potentially result from three aspects of this project: habitat disturbance during construction and acid deposition and noise effects during launches.

#### **4.4.1 Construction**

The following subsection describes potential impacts resulting from construction of the parking lot and road. Mitigation measures to minimize identified impacts are presented in the subsequent subsection.

##### **4.4.1.1 Potential Impacts**

With the construction of a 60 by 90 meter (200 by 300 foot) parking lot and 670 meters (2,200 feet) of 6 meter (20 foot) wide road, approximately 2½ acres of native undisturbed and disturbed habitat will be lost. Surveys for special-status plant species which potentially occur within the parking lot and road construction corridor have identified the presence of dune mint in two

locations near the SLC-2E boundary. The proposed routing of the new road has been situated to avoid these populations. Based on this routing and the lack of other special-status species within the project boundary, no direct impact to special-status plant species is expected to occur as a result of the proposed action. To ensure this conclusion is valid, mitigation measures described in the next subsection will be implemented.

The construction of the road through the dune mint habitat will result in approximately 0.1 acre of potential dune mint habitat being unavailable for reestablishment of the plant. Mitigation measures to address this loss are presented in the next subsection.

No special status animals are known to live within the road construction corridor. Short term disturbance to local residents will occur during grading and road construction. Most potentially impacted species are expected to leave the immediate construction area, and some smaller, less mobile animals may be killed. However, the disturbance is expected to be transitory and any animals displaced during construction will be replaced by others migrating in from adjacent populations. Thus, impacts to animals from road construction is expected to be insignificant.

#### **4.4.1.2 Mitigation Measures**

To ensure that the dune mint is protected,

- a qualified botanist will conduct a preconstruction survey with the construction engineer to verify that no dune mint will be removed. If dune mint plants are identified during this survey, the final road alignment will be adjusted to avoid an impact.

To minimize native habitat loss, reduce erosion potential, and facilitate the reestablishment of native vegetation:

- the footprint of the temporary use areas for construction of the parking lot and road will be kept to a minimum,
- the topsoil removed from the site will be stockpiled and returned to the unpaved area following construction, and
- the parking lot and road will be contoured to minimize focused runoff which could lead to localized erosion.

- During final design for the parking lot, erosion will be further minimized by installing erosion control devices if required. Examples of such facilities may include gravel-lined, blind slumps at low spots in the lot, or multiple drainage points.

Because the unpaved areas will be kept to a minimum and erosional potential will be as small as feasible, no active revegetation program will be undertaken as a part of this project.

Because roughly 0.1 acre of potential dune mint habitat will be lost through the construction of the road,

- 0.2 acre of disturbed potential dune mint habitat in adjacent areas will be rehabilitated. Such areas are common near the launch pad. Rehabilitation will consist of removing ice plant and providing stabilization of the dunes if required. The rehabilitation will be completed in coordination and under the direction of the VAFB botanist.

#### **4.4.2 Launches**

##### **4.4.2.1 Acid Deposition from the Exhaust Cloud**

A common component of rocket exhaust clouds is HCl. The presence of this acid could cause substantial local impacts to vegetation or animals contacting the acid cloud. In particular, because of the proximity of the least tern and snowy plover nesting sites to the launch site, the USFWS has expressed concern that under adverse wind conditions acid deposition from HCl contained in the ground cloud could impact these birds. However, several factors prevent such an impact from occurring.

The November 4, 1995 launch of the Delta II was monitored for indications of pH changes in the surrounding air caused by HCl vapors or deposition (Appendix E). Conditions were calm during the launch, and, as a result, the potential for significant acid deposition would have been maximal. The nearest test strips were located at the perimeter of the launch pad at a minimum distance of 100 yards (or meters) from the rocket. No pH changes occurred on any test strips and there was no evidence of acid deposition. The lack of pH change associated with the small ground cloud indicates that even with exposure to the concentrated cloud, acid deposition would be minimal (USAF 1995.)

Titan IV and Space Shuttle launches have also been examined for acid deposition. NASA Technical Memorandum 83103 states that Space Shuttle launches result in acute vegetation damage due to HCl deposition in an area of approximately 22 hectares near the launch pad. The effects are expected to increase in the area immediately surrounding the launch pad depending upon launch frequency. Finally, the effects of contaminants associated with the

exhaust clouds on wildlife using areas which receive deposition are currently unknown but may be consistent with changes to vegetation (NASA 1993). Studies of Titan IV launches show that emissions of HCl have not resulted in significant impacts to terrestrial fauna (Engineering Science [ES] 1987; ES and Sea World Research Institute [SWRI 1988]). However, direct observations of a Titan IV launch (USAF 1990) did not find any evidence of wet deposition of HCl outside the pad perimeter.

Both the Titan IV and Space Shuttle are larger than the Delta II, and, unlike the Delta II, use deluge water for heat and sound suppression. For comparison, the Delta II SRM by propellant weight is 40 percent of the Titan IV; a conservative estimate is that total launch emissions (SRMs plus main engine) of Delta II is less than 40 percent of the Titan IV emissions. The ground cloud associated with the Delta II is relatively small, roughly 300 to 120 meters (400 feet) in radius as compared to roughly 250 meters (800 feet) for the Space Shuttle. The result of these differences is the Delta II does not produce a large acid mist cloud as does the Titan or Space Shuttle.

#### Vegetation

While a specific study has not been completed to determine impacts to adjacent vegetation, there have been no obvious changes to vegetation in the immediate vicinity of the launch pad. The area surrounding the pad is dominated by introduced ice plant. There have been three launches in the six months from November 1995 to April 1996. There has been no apparent change in the condition of the ice plant in the past year. It appears that the lack of an acid ground cloud has avoided impacts to the adjacent vegetation.

#### Wildlife

Based on the expected absence of significant acid deposition, no impacts to wildlife is expected from this source.

#### Special Status Species

The greater concern for acid impacts is the adjacent colonies of least terns and snowy plovers. The distance to the nearest breeding site is roughly 670 meters (2,200 feet). For the ground cloud to reach the breeding areas, it would need to maintain its integrity for long enough to reach this site. Launch constraints preclude launching when winds exceed roughly 40 km per hour (25 miles per hour). At this wind speed, it would take roughly a minute for the cloud to reach the colony. However, there is a considerable turbulence set up by the launch. If there is sufficient wind to rapidly move the cloud to the nesting area, the combination of the wind and launch turbulence would combine to disburse the cloud. It is highly unlikely that it would reach

the breeding area in a concentrated form. Given the results of the acid deposition study, it appears that even if the concentrated cloud could reach the colony, there would not be any significant quantity of acid to affect the eggs or birds.

Based on the limited data, it is assumed that direct impacts to the surrounding vegetative communities or the adjacent least tern or snowy plover nesting areas will not occur from an individual launch or from the cumulative impact of multiple launches annually. At present, there is a launch constraint that prevents launches when winds blow from the launch pad toward the least tern colonies. Because the data indicate that acid mist would not reach the colonies, it would be appropriate that the launch constraint be lifted.

#### **4.4.2.2 Noise Impacts**

Space vehicle launches produce noise and vibrations that could potentially affect animal species in the general vicinity of the launch site, but since a launch vehicle gains altitude and accelerates quickly after a launch, these stimuli are necessarily of short duration. Delta II space vehicle launches from SLC-2W will be limited, intensive events with sound levels above 100 dBA lasting for approximately 20 seconds.

Noise can affect animals in a variety of ways and in different timeframes as presented in Table 4-8.

Very low frequency vibration amplitudes from the launches have not been measured and their effects on animals are poorly understood. The following assessment of vibration phenomena will be confined to the effects of noise that is likely to be perceptible to animals.

#### **Impacts on Aquatic Animals**

Given the distance to aquatic resources of roughly 3,000 meters (or yards) for marine water and 1 ½ km (1 mile) for fresh water, the attenuation due to the water, and the short duration of the noise, no effects to aquatic animals, such as fish, amphibians, and reptiles is anticipated. Similarly, there is expected to be no impact on fully aquatic marine mammals such as whales and dolphins.

#### **Impacts to Amphibious Marine Mammals**

Marine mammals hauled out along the coastal region of VAFB will be exposed to excess noise for the short duration of the launch event. NMFS has expressed particular concern for seals hauled out at Purisima Point and the Spur Road Site. Two main types of direct impacts are expected to have the potential to occur with a rocket launch, hearing loss and startle response.

TABLE 4-8

Noise Impacts to Animals

Duration	Impact
Immediate	causing hearing damage or impairment
	triggering traumatic startles (startles in which the animal injures itself or others)
	masking biologically significant sounds (i.e., sounds made by predators)
	driving animals out of favored areas, or by separating them
Shorter Term	affecting growth and resistance to disease
	reducing energetic efficiency
	causing mortality
	provoking emigration
Longer Term	inducing reproductive failures
	causing changes in distribution and abundance
	altering predator - prey interactions, leading to ecological changes
Source: Jassen, 1980 cited from NASA, 1993	

Hearing Loss

Noises of sufficient magnitude could cause hearing loss either temporarily or permanently. No information is readily available on seal hearing loss related to excess noises. In the absence of such data, noise levels expected to be protective of hearing loss in humans can be compared against the noise levels resulting from the Delta II launches at Purisima Point. This comparison is appropriate if elevated noise levels are assumed to cause comparable or less hearing loss in seals than humans. This assumption is discussed further below.

OSHA set short-term exposure limits for humans for A-weighted exposures of 15 minutes or less at 115 dB. Figure 3-2 presents OSHA's exposure thresholds as a function of noise frequency. The minimum amount of noise allowed for exposure to any specific frequency occurs at roughly 3,000 Hz. At lower frequencies, permissible levels are far in exceedance of this value. Figure 4-2 shows that the maximum noise of a rocket launch occurs at the lower frequencies, roughly between 10 and 300 Hz. Thus, assuming that OSHA standards that would protect human hearing would also be protective of seals, there would be no long-term impacts to seal hearing even to those individuals closest to the launch site. Also, since there is no expectation that sonic

booms will be heard by harbor seals hauled out at SLC-2W, no long-term impact from this source is expected either.

As mentioned earlier, these conclusions are based on the assumptions that seals and humans would show similar long-term negative effects to hearing from comparably loud noises. This assumption may be conservative because of the adaptations seals have evolved in response to an amphibious existence. In comparison to terrestrial mammals, seals show a thickening of the ossicles in the middle ear, and cavernous tissue in the middle ear cavity and the outer ear canal (Renouf 1991). These modifications are expected to be in response to the ear's need to withstand increasing underwater pressure. Other anatomical differences include a smaller ratio of the tympanic membrane to the oval window, and enlargement of the basal whorl of the cochlea, and a widening of the cochlear aqueduct.

#### Startle Reaction

Because of the relatively short distance between SLC-2W and the nearest seal haul out sites, launches are expected to cause an immediate startle response.

#### Observed Reactions

The responses of harbor seal and sea lion colonies were observed during launches of the Taurus Small Launch Vehicle (SLV) on March 13, 1994 from Site 576 and Titan IV on August 2, 1993 from SLC-4E (Stewart et al. 1994, Stewart et al. 1993). For both launches, seals and/or sea lions moved to the ocean upon hearing the launch noise. During the Taurus launch, the harbor seal population on Purisma Point roughly 2¼ km away was subjected to a noise of roughly 108 dB for 40 seconds. Most of the individuals on shore (20 of 23) fled to the ocean. Similar effects were observed for pinniped colonies along the coast and at the Channel Islands in response to the Titan launch, although the number of individuals that moved and the type and duration of the response was a function of the loudness of the sound and the species affected.

Based on these observations it is expected that marine mammals located at the Spur Road Site and at Purisima Point will show an immediate startle response and will flee into the water. Animals as far away as Rocky Point will likely show at least a minimal startle response and may react to the noise by lifting their heads or going into the water.

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### Inferred Reactions

The number of harbor seals hauled out at Purisima Point and the Spur Road Site were monitored for three days before and three days after the latest two launches of the Delta II from SLC-2W (USAF 1996a, ENSR 1996). Launches occurred in the pre-dawn morning at mid to high tide. Based on data from Roest (1995) that show few or no seals hauling out at these locations at high tide, it was assumed that relatively few seals would have been hauled out during these launches.

Figures 4-3 and 4-4 present the monitoring data and show no apparent differences before and after the launches. Based on this information, there will likely be no change in numbers of seals using these two haul out locations when launches occur under sub-optimal haul out conditions. Such conditions would be at mid to high tide or at night. No information presently exists to determine short-term impacts to seals under optimal haul out conditions.

### Historic Activities Near Purisima Point

Historically, the Purisima Point area has been used actively for well over a half century. The Army used the area for weapons training including extensive armored weapons firing prior to the Air Force using it for rocket launches. It is likely that disturbance to the seals hauled out at Purisima Point and the Spur Road Site would have been comparable to or greater than those resulting from the present launch activities.

The Air Force began rocket launches in 1958. Figure 2-1 presents a record of launches from the Purisima Point area for the past 38 years. Base-wide launches peaked in the early 1960's, but have maintained at an average level of roughly 20 per year since the 1980s. These launches represent a wide-range in sizes and types of launch vehicles.

Data on the seals at haul out areas near Purisima Point are not available for this same period. Thus, there is no information to determine if fewer or more seals used these sites during the height of the launch activity than before or subsequent to these peak years. However, given the extremely high launch rate of the 1960's with the current lower level but sustained launch rate, rocket launches from SLC-2W have not prevented seals from using the beaches along this portion of VAFB.

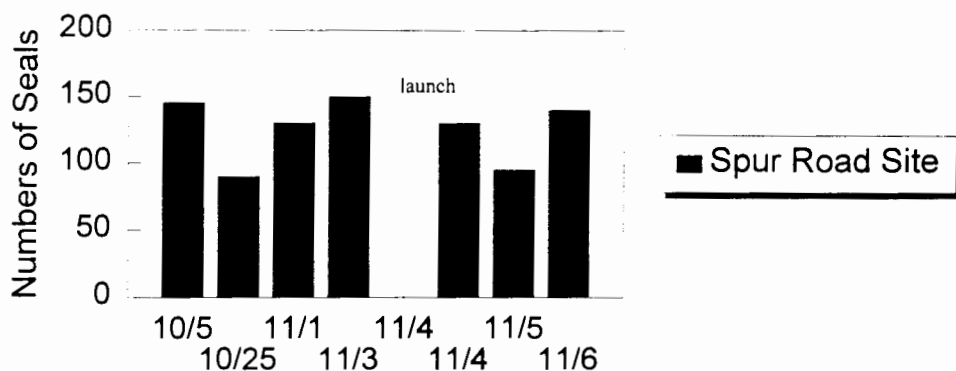
### Current Status

On September 19, 1995, NMFS issued an Incidental Harassment Authorization which was based on the assessment of noise impacts discussed by NMFS published in the Federal Register (August 18, 1995). The NMFS concluded that launches of Delta II rockets proposed for this project will not significantly impact harbor seals at these two haul out locations. They provided



# Daily Seal Counts

November 1995 Launch

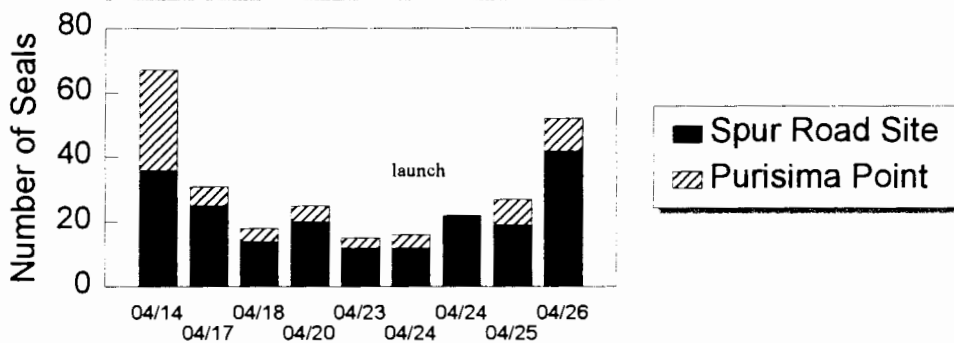


First data for 11/4 ~2 hours after launch (high tide)  
Second data for 11/4 at low tide (~6 hours post-launch)

FIGURE 4-3. Harbor Seal Survey Results (Spur Road Site)

# Daily Seal Counts

April 1996 Launch



First data for 4/24 2-3 hours after launch (mid tide)  
Second data for 4/24 at low tide (~4-5 hours post-launch)

FIGURE 4-4. Harbor Seal Population

several conditions for the consideration of launch dates and times, monitoring of the launches, and reporting of the results. Based on the results of the data collected in support of the permitted launches, modification to the conditions are presented in the following Mitigation Measures section.

### Sonic Booms

Focused sonic booms result in maximum noise impacts at the point that the sound wave intersects the earth. Because the launch azimuth takes the rocket well west of the Channel Islands, no focused sonic booms are expected to occur there. The magnitude of the sonic boom which may be audible at the Channel Islands is expected to be sufficiently small so as to elicit no significant response from the resident marine mammals (ES 1988).

### Other Marine Mammals

The sea otter colony living off Purisima Point also has the potential to be affected by launch noises. However, sea otters spend the majority of their time in the water. It is likely that upon hearing the noise they would dive underwater. This response might separate a pup from its mother; however, since pups and mothers are routinely separated during foraging, it is likely that the pair would quickly reestablish contact. This assumption is strengthened by the fact that the sound would be of short duration and the stimulus to separate the pair would be quickly removed.

### **Impacts to Terrestrial Wildlife**

Wildlife adjacent to SLC-2W would also be exposed to high intensity, short duration noise from launches. USFWS expressed particular concern for the least tern and snowy plover nesting areas at Purisima Point.

### Immediate Impacts

Potential immediate impacts to wildlife adjacent to SLC-2W could result either directly from damage to hearing or indirectly from the animals being startled and responding.

#### Damage to Hearing

Bird hearing is similar across taxa (Dooling 1946) and generally less sensitive than that of humans. However, there are a few exceptions such as owls, pigeons, and doves. Most birds, since they are relatively insensitive to sounds below 100 Hz, are unlikely to experience auditory

damage from sonic booms or launch noise. However, no studies have been done to support or refute this notion. Diurnal raptors, such as the peregrine falcon and the bald eagle, are not likely to have a sense of hearing as sensitive as that of the owls, nor is their range of sensitivity as great as that of the doves, based on studies of the sparrow hawk (Trainer 1946).

A similar conclusion can be made for marine birds, based on studies of gulls (Counter 1985). The threshold for temporary auditory damage to birds from exposure to a single sonic boom has been found to occur in the range of 138 dB to 169 dB (Chappell 1980). Because the launch sound will be of short duration and not be above general auditory thresholds for damage, it is assumed that the hearing of least terns and snowy plovers will not be affected by noise from the launches.

Other animals present near the pad during launch may be exposed to louder sounds than least terns or snowy plovers. This exposure could lead to temporary or permanent hearing loss in these animals. No wildlife species expected to receive such exposure are sufficiently rare such that the loss of a few individuals would impact the entire population. Based on this understanding, while some individuals may be affected, potential overall impacts to wildlife hearing would be insignificant.

#### Startle Effect

The effects of helicopter noise on peregrine falcons and golden eagles has been studied (Ellis 1981). Raptors did fly up in response to helicopter overflights (noise levels 82 to 114 dbA), but settled rapidly, and there was no evidence of opportunistic predation on their nests. Adverse effects on nesting success, adult mortality, or territory use were not found.

Startle responses in marine birds are known to occur at impulses of as little as 80 to 90 db (Bowles and Stewart 1980). Birds will generally run or fly in response to sonic booms and loud overflights (Speich et al. 1987; Bowles and Stewart, 1980). However, despite rather intensive long-term studies, there is no evidence that leaping, self-injury, crushing, or breeding colony abandonment will occur with marine birds as a result of startle response brought on by sonic booms or loud overflights (Bowles and Stewart 1980; Schreiber 1980; Black et al. 1984; and Speich et al. 1987).

The responses of least terns or snowy plovers during a launch from SLC-2W have not been observed. Other birds perched on wires and buildings near SLC-2 have been seen to fly up at the initiation of the launch, but they return to the pad soon after the rocket is away. While no similar information is available for least terns or snowy plovers adjacent to SLC-2W, it has been assumed that their response would not be substantially different.

Under normal conditions, least terns would be expected to flee a threatening situation. However, their response to a given threat while they sit on an established nest is likely to be less dramatic. Snowy plovers tend to respond to moderately threatening situations by flattening themselves against the substrate in an attempt to hide. Depending upon the specific bird, and the type and magnitude of the threat, e.g. a rocket launch, snowy plovers may or may not leave their nests. Monitoring of snowy plovers during the launch of the LLV on August 15, 1995 was completed for two populations located somewhat over 9 km (5¾ miles) from SLC-6. Snowy plovers showed an immediate disturbance behavior by ceasing activity and lying flat on the sand. Disturbance behavior appeared to be entirely visually triggered. Within 5 minutes after the launch, all birds had resumed normal behavioral (Persons 1995). While these birds were roughly eight to ten times farther from the launch than are the snowy plovers adjacent to SLC-2W, in the absence of any other direct information, it is assumed that snowy plovers will not flee the site. Support for this assumption is drawn from the most recent Delta II launch from SLC-2W.

The day prior to the April 24, 1996 Delta II launch from SLC-2W, four pairs of snowy plovers were nesting several thousand meters (or yards) north of the pad. Monitors checked the nests as soon after the launch as allowed by safety personnel. All nests were still occupied (Watkins, personal communication, 1996). While this information suggests the birds were not affected, in the absence of direct observations, it is still possible that one or more nests could have been abandoned for a sufficient amount of time to have allowed the eggs to cool sufficiently to kill the embryos or for predators to steal some of the eggs. These potential impacts are still being evaluated.

Just as least terns and snowy plovers are expected to show a startle response, so too are pelicans that may be resting near SLC-2W during a launch. An August 1995 launch of an LLV from SLC-6 (Polland 1995, cited by N. Read, 1996) was monitored for a startle response by pelicans at Destroyer Rock, (Point Pedernales), Rocky Point, and Point Arguello roughly 2 miles from SLC-6. Pelicans showed a startle response by flying up but most settled within 15 minutes and showed no long term effects. Polland determined that significant impacts would not result to this species from such launches. Thus, based on these results of the LLV monitoring, it is assumed that pelicans roosting near SLC-2W will not be significantly impacted by the current project.

As discussed above, other birds adjacent to the pad are expected to be startled by the launch, but settle quickly after the rocket is away. Similarly, other ground dwelling animals would be startled but a significant number are not expected to be harmed by their reactions.

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### Longer-term Impacts

Long term impacts could result from changes in populations as animals move away from the area. For species with sufficiently wide ranging distributions, and for mobile species with breeding grounds away from the site, long term impacts are not expected to occur. Only for these species with adjacent breeding grounds and very limited distributions would impacts be expected to be potentially significant.

### Non-Special-Status Wildlife

Long term impacts to adjacent wildlife species are not expected to be significant. No animals potentially affected through hearing loss or startle effects or that could be destroyed directly through blast effects occur sufficiently rarely such that the local negative effects on a few individuals would significantly affect the overall population.

### Special Status Species

Only least terns and snowy plovers are known to have breeding colonies adjacent to SLC-2W. The other special-status species, i.e., bats, peregrin falcon, and pelicans breed elsewhere. Short term startle effect are not expected to result in long term population changes. Support for this assumption comes from the presence of these visitors at the site.

Populations of least terns and snowy plovers have been decreasing in California (Page et al. 1986, Fahy and Shultz 1996). The primary reason for the decline is a loss of coastal habitat available for nesting. VAFB provides a nesting area that is relatively sheltered from human impacts because most of the nesting areas have restricted public access. Because no least tern or snowy plover nesting habitat would be lost as a result of this project, this type of impact will not occur.

It has been suggested by the USFWS that rocket launches at a critical period during nesting could cause the birds to leave the VAFB nesting areas and move to alternative nesting areas in adjacent regions. With the continued loss of nesting habitat in these alternative locations, launches that cause birds to leave the Point Purisima area could have long term impacts to the population. These potential impacts are discussed below.

On VAFB, the primary cause of least tern and snowy plover mortality is predation (Fahy and Schultz 1996, Small 1995). The USFWS indicated concern that rocket launches could cause the birds to leave their nests for sufficient periods of time that nest predation could affect nesting

success. Activities that affect predation, either positively or negatively, may affect the least tern and/or snowy plover populations. These potential impacts are also discussed below.

#### Historic Launch Activity

Figure 2-1 shows the number of rockets that have been launched for the sites adjacent to SLC-2. These sites include SLC-1E, SLC-1W, SLC-10E, SLC-10W, and site 576. The rockets launched from these sites were nearly all Thor or Delta rockets and are, thus, all within the same evolved family of rockets. Because the rockets are all based on the same core booster, impacts to the adjacent biota could be expected to be similar for all rockets in the family.

Annual launch activities of the Thor/Delta family of rockets near Purisima Point has been as high as 28 with sustained annual activity averaging between 15 to 20 launches for approximately the first decade. Figure 4-5 shows that launches for these facilities have been relatively evenly spread across the year with somewhat fewer launches in April and May and somewhat more launches in June.

#### Least Tern Activity

No detailed survey records exist for least terns on VAFB near Purisima Point during the early period of heaviest launch activity. The first report of least terns at VAFB was in 1978 by Al Naydol, Wildlife Biologist, VAFB (Naydol, 1996). Mr. Naydol asked the California Department of Fish and Game about least terns locally and was told that they had no record of these birds occurring on VAFB. Because the dunes at Purisima Point appeared to be an appropriate habitat for least terns, he conducted an initial survey of the area and found a substantial colony of least terns there. Shortly after Mr. Naydol found the least terns, a Thor/Block 5D-1 rocket was launched from SLC-10W (April 30, 1978). When he returned to the site shortly thereafter, there were no least terns. He assumed that the birds had been scared and moved elsewhere. Since it was unknown if the least terns would return, Mr. Naydol surveyed the area again in 1979 and found that there were roughly 100 least terns at the Purisima Point site. Based on his observations of least terns on and near VAFB, he speculated that the local populations of least terns varied year-to-year and suggested that if adverse conditions occur at one site, e.g. a rocket launch in late April, they may simply move on to other nesting areas.

Concerted monitoring efforts for least terns began in 1978 well after the peak launch activities. Figure 4-6 shows least tern nests at the Purisima Point colony, the Santa Ynez Colony, and the San Antonio River Mouth/Beach 2 colonies since monitoring began in 1978. There exists a substantial variability in nest production at each location on VAFB. Maximum nesting at Purisima Point occurred in 1994 followed closely by 1995. Selective predator control coupled with electric

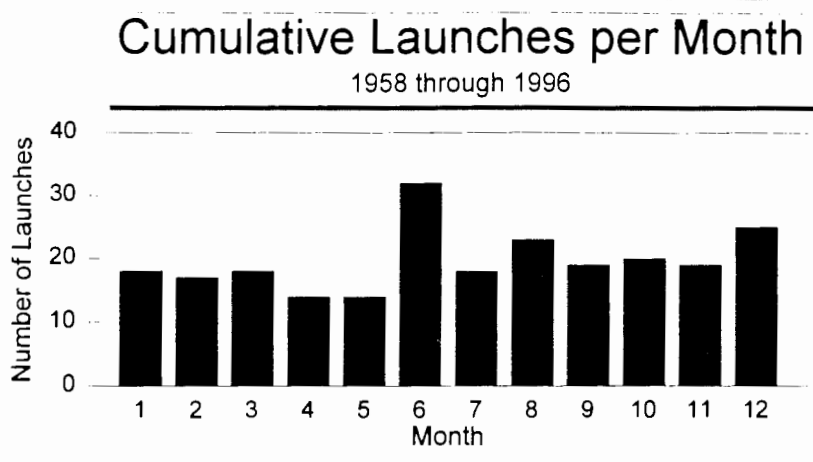


FIGURE 4-5. Launches Per Month

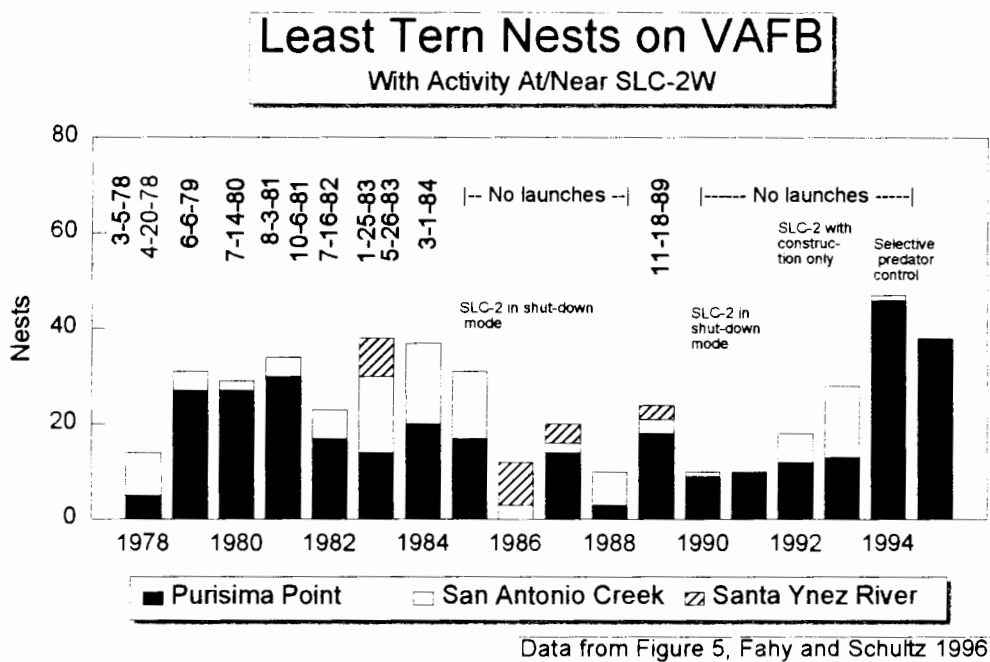


FIGURE 4-6. VAFB Least Tern Colonies

fencing to exclude most mammalian predators was implemented during 1993, 1994, and 1995. No nests were found at Purisima Point in 1986 and the next lowest periods occurred in 1988 and 1978. In addition to nesting, Figure 4-6 also indicates the dates of launches that occurred during this period. No launches occurred at or around SLC-2W from 1984 through 1989.

The nesting success for least terns at Purisima Point does not follow any consistent pattern such that nesting success in one year can be used to predict nesting success in subsequent years. For example, 1978 had the third lowest number of nests, while 1979 had the fourth highest number of nests. These data are not readily amenable to meaningful statistical evaluation because there is no consistent pattern of launch activities to correlate with changes in nesting activity. Because of this limitation, the analysis is limited to looking at trends within the data and examining Mr. Naydol's anecdotal data. Four of the five years with lowest least tern nests on VAFB occur when no launch activity occurred at Purisima Point launch facilities. This absence of launch activity resulted in minimal activity at SLC-2W in general.

Conversely, except for 1994 and 1995 when predator control activity occurred at Purisima Point, the seven years with the highest number of least tern nests occurred when launches also occurred. Thus, general activity at the pad is roughly correlated with greater nesting activity in the adjacent nesting areas.

### Snowy Plovers

Data on snowy plovers at Purisima Point are less readily available than for least terns. The Point Reyes Bird Observatory has conducted a number of censuses of snowy plovers around the state and in other western states (Page and Stenzel 1981, Page et al. 1986), however only since 1993 have systematic records of snowy plovers on the beaches of north VAFB been kept. Data from Page et al. (1986) and others (see Page et al. 1986 for a more complete set of references) indicates that there have been a population of roughly 100 or more snowy plovers at the Purisima Point area since 1977. They provided no estimate of historic use of the site before 1977. Figures 3-9 through 3-11 present the recent data for snowy plovers near Purisima Point. Because the data were conducted at different times and the studies were based on different objectives, the historic data and the recent data cannot be directly compared. However, even given the limitations of comparing the different types of data, it appears that there has been a consistently robust population of snowy plovers on north VAFB for the past two decades. The data are insufficient, though, to identify if there are long term increases or decreases in the populations.



### Tentative Conclusions

The lack of a good database to correlate the effects of launch activities makes drawing definitive conclusions impossible. However, two tentative conclusions can be advanced based on the preceding discussion:

- Active predator control measures substantially increased least tern nesting.

Least tern nesting at Purisima Point occurred at a considerably higher rate when active predator controls were in place (1994/1995) than prior to those measures being implemented.

- There may be a critical time period when least terns first arrive at the nesting site that they are particularly vulnerable to launch disturbances. This critical time may be only several weeks and occur just as the least terns arrive.

The one launch that occurred just as the least terns arrived (1978) resulted in an abandonment of the site for one year, but resulted in no reduction in nesting in the following year (Naydol 1996). Subsequent launches that occurred during the breeding season while least terns were present (although not within this critical time period) were not correlated to nest abandonment. Thus, launches after the critical period may cause startle responses but would not be expected to cause an abandonment of the nesting sites.

It should be noted that while MDA has proposed up to 10 launches per year, no more than five could occur within the full least tern breeding season and six could occur within the full snowy plover breeding season. More importantly, it appears that only one launch would be expected to occur within the critical time frame for nest selection which may be as short as four weeks.

MDA requires a minimum preparation time of 5 weeks to ready a rocket for launch. Thus, if MDA were to operate at full capacity, theoretically it could launch as many as six rockets during a seven month period. While such a schedule is possible, the likelihood of such an event is small. Equipment requirements and launch constraints commonly cause schedules to change and launches to be delayed. Also, at this writing, MDA does not have contractual commitments to create the need for launching a rocket a month. Thus, the potential for least terns or snowy plovers to be exposed to launches during the critical period, much less a launch every five weeks, is remote.

Based on the historic but circumstantial evidence, it is expected that the populations of least terns near SLC-2W will not be substantially affected by an increase in Delta II launches. The increased number of launches increases the potential that a launch would occur during a critical

period just as least terns are selecting nesting sites. If such an event happened during several successive years, the potential exists that over time least terns could abandon this site entirely. However, based on the observation that disturbance one year did not affect nesting activity in the subsequent year, and considering that least terns and snowy plovers were present at the site after two decades of launch activity at a rate considerably higher than that proposed here, it is expected that the increased launch rates will not have a negative impact to the long-term health of the species at VAFB.

### **Mitigation Measures**

The addition of eight Delta II launches from SLC-2W is not expected to result in significant impacts to the biotic environment in the region. However, to ensure no significant impacts to biotic resources occur, the following mitigation measures and a program of monitoring pinnipeds, least terns and snowy plovers has been and will continue to be implemented.

Coordination between a variety of agencies has been ongoing to protect and preserve species and to investigate and determine various effects on endangered species from external sources (i.e., predation, acoustics, emissions, etc.). As part of that effort, programmatic consultations are underway between the USAF and USFWS for protection of threatened/ endangered species and between USAF and NMFS for protection of marine mammals, to encompass all foreseeable launch programs at VAFB. Mitigation measures developed for that program are expected to take precedence over mitigations presented herein.

Pinnipeds and threatened/endangered species will be monitored for launch impacts following protocols identified in consultation with NMFS and USFWS. In addition, ongoing management efforts by VAFB focus on protection of least terns, snowy plovers, and pinnipeds in the Purisima Point area using a variety of measures, including but not limited to :

- establishment of buffer zones to avoid disturbance from aircraft overflights and other disturbances,
- selective predator control, and
- regular monitoring to evaluate population status and reproductive success.

It should be noted that these three measures are not mitigations for potential impacts to protected resources resulting from this project. Monitoring measures agreed to by MDA for granting the CCC Consistency Certification include the following:

- In any given year, no more than three launches will occur between April 15 and July 31.
- Status of nesting western snowy plovers and California least terns will be monitored before and after launches that occur between 1 March and 30 September, to determine if launches impact site use and/or reproductive success. The feasibility of remote video-monitoring of least terns and snowy plovers during daylight launches during the most critical time during the nesting season (between 15 April and 31 July) will also be investigated, and implemented if appropriate.
- After five launches have occurred between April 15 and July 31 when least terns and snowy plovers are present, the data will be reviewed with USFWS to assess potential impacts to least terns and snowy plovers.

#### **4.4.3 Cumulative Impacts**

Because of the isolated nature of SLC-2 and the relatively small amount of vegetation which will be removed for construction of the new road, no significant cumulative impacts are expected to result from the proposed construction action when considered with other projects on VAFB.

The launches at SLC-2 are periodic and not generally scheduled to accommodate launches at other facilities. Coordination occurs to the extent that simultaneous launches or successive launches from adjacent facilities do not typically occur. In addition, the length of lead time required for preparation for a launch at most facilities precludes launches in quick succession from any local area.

The Air Force has projected a maximum of 31 launches over the next 2 FYs including 17 in FY96 and 14 in FY97. It was concluded in the LLV EA (USAF 1994a) that this level of anticipated launches will produce no significant impact to biological resources (USAF 1994a). Specific discussions concerning impacts from all launches at VAFB on biological resources are the focus of consultations between the USFWS, NMFS, and the AF. Conditions established in that consultation will reduce the impacts and are assumed to ensure that potential impacts are insignificant.

#### **4.4.4 No Project Alternative**

With this alternative, there will be no loss of potential dune mint habitat nor will there be an enhancement of additional dune mint habitat. Impacts to the local biota will occur less frequently, however, because most effects were assumed to be transitory and not cumulative, the impacts are not expected to differ from those occurring with the project. Also, because

launches could still occur during the critical period of the least tern and snowy plover nesting season, impacts of the no project alternative would not necessarily be significantly less than for the project.

## **4.5 Hazardous Materials**

Hazardous materials can be used or generated during both construction and operation.

### **4.5.1 Construction**

Because construction of the road, parking lot, and new buildings is not in areas of known surface contamination (Section 3.5.3), no impacts from removal of contaminated surface soils are expected to result from this portion of the project. However, groundwater is contaminated across this area and it is likely that the depth to groundwater is as shallow as 2 meters (7 feet) bgs. However, because road construction is not expected to disturb soils deeper than 1.2 meters (4 feet), particularly in low areas, it is not anticipated that TCE contaminated ground water or soils will be disturbed.

To ensure TCE contaminated groundwater will not be disturbed, preconstruction soil borings will be completed to determine if groundwater occurs shallower than the anticipated excavation depth. If shallow ground water could be impacted by road construction, the road construction plan will be modified to ensure that groundwater is not disturbed.

To ensure TCE contaminated soils are not disturbed during construction, excavated soils will be screened for VOCs. A photoionization detector (PID) or flame ionization detector (FID) will be used to determine whether collected soil contains volatile levels of TCE. Soil samples will be collected at low spots of the proposed road where excavation is required to depths greater than 2 feet below existing grade. Soil samples will be collected approximately every 100 feet in these areas and placed in glass jars with sufficient headspace allowed for monitoring with a PID or FID. Background samples which indicate greater than 10 ppm of VOCs above background levels will be further screened for TCE using a Draeger tube.

Based on these soil screening techniques, disturbed soil containing TCE will be placed in roll-off bins lined with plastic and temporarily stockpiled onsite pending offsite disposal or treatment. TCE-contaminated soil generated during this project will be disposed of in accordance with all applicable Federal, State, and local rules and regulations. The primary option for management of TCE-contaminated soil is for the waste to be processed for disposal through the Defense Reutilization Marketing Office (DRMO). If the DRMO cannot support the waste disposal and documents it in writing, then the waste will be processed for disposal by a contractor through

the CES/CEVCC (Romero 1996). Disposal will comply with the requirements of the National Contingency Plan and the VAFB HAZMAT and Emergency Spill and Response Plans (USAF 1994b).

#### **4.5.2 Operations**

Hazardous material associated with operation include both fuels and wastes.

##### **4.5.2.1 Fuels**

The project will result in additional transportation of fuels to VAFB. The impact of the additional transportation is assumed to be insignificant for the same reasons as identified in the EA for the California Spaceport (USAF 1995). These reasons include the many safety systems in place to minimize accidents and to respond rapidly and efficiently if such spills were to occur.

##### **4.5.2.2 Waste**

Launching eight additional flights from VAFB will also result in the production of eight times the amount of waste beyond that already occurring. MDA estimated their launch-related wastes are roughly two 200 liter (55 gallon) drums and most of that is nonhazardous. MDA operates in conformance with the VAFB Hazardous Waste Management Plan. Based on this conformance and based on the ability of the base to deal with the slight increase in hazardous materials resulting from this project, the impact from the project to hazardous materials use and generation at VAFB is expected to be insignificant. This conclusion is appropriate for both the proposed action considered alone or cumulatively with other similar projects.

#### **4.5.3 Cumulative Impacts**

As concluded in the California Spaceport EA (USAF 1995), "the comparatively minor amounts of required propellants for the spaceport program would not add significantly to the quantities transported to Vandenberg today." Since less fuel would be required for the current project, it is assumed that there would also be no significant cumulative impact from the current project.

The production of hazardous wastes are also assumed to be small relative to the capacity of VAFB to handle such materials. Based on this result, it is assumed that no significant cumulative impacts to hazardous materials will result from this project.

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#### **4.5.4 No Project Alternative**

The no project alternative would cause no change in the amount of hazardous materials used at or generated at SLC-2W. Because the systems are well established to handle such materials, this alternative poses no significant environmental impact.

### **4.6 Socioeconomics**

#### **4.6.1 Population**

Construction workers will be hired from the local labor pool; therefore, no significant impacts to the existing population will occur.

At its peak activity, roughly 110 additional people will be working at SLC-2W. Since many of these individuals will be associated with specific missions for short durations, it is not expected that they will move to the VAFB area. Rather, they will be housed in temporary housing such as local hotels, motels, local apartments, and short-stay facilities. Given the amount of available housing relative to the few people who would be relocating to the VAFB area on a temporary or long-term basis, it is expected that there will be no significant impact to population from this project.

#### **4.6.2 Economics/Employment**

Construction workers will be hired from the local labor pool. For the short duration of the construction, there will be an economic benefit from the project through increased employment locally.

It is assumed that the majority of individuals used for support of the additional launches will come from outside of the VAFB area. Since most of these personnel will be temporary, it is assumed that there will be no significant impact on local employment. Since the majority of personnel will be temporary, it is anticipated that they will generate revenues at local establishments, particularly restaurants, hotels, and recreational establishments. It is assumed that there may be a slight increase in revenues, although it is not expected to be substantial enough to be statistically noticeable.

#### **4.6.3 Cumulative Impacts**

Based on the low growth potential associated with this proposed action, it is expected that the project will provide no cumulative impacts when considered with other reasonably foreseeable projects.

#### **4.6.4 No Project Alternative**

The no project alternative would result in no change in the work force from the current levels. Given the small size of the project, it is unlikely that the impact of the no project alternative would be significant.

### **4.7 Land Use**

#### **4.7.1 Construction**

Since no changes to current land use will result from the construction of the roads or buildings, the environmental impacts to land use will not be significant.

#### **4.7.2 Launches**

The proposed action will not require a change in land use from its current use. Based on the low level of recent flight activity from SLC-2 and adjacent facilities, the increased launch activity will result in a slight increase in the number of closures at the nearby public beach at Ocean Beach at surf. This closure typically lasts 4 hours. Recent launches have occurred in the middle of the night causing little or no impact to public use of the beach.

Based on recent launches, with this project, it is anticipated that no more than two launches per year would occur on weekends, and it would be rare that they would cause the public beach to be closed for more than several hours. The proposed action will not cause an exceedance of the historic number of launches requiring beach closures (21 launches per year on average over a 10-year span).

To minimize the potential impact to recreational use of the beach, several measures will be implemented. Unless required by mission constraints, the scheduling of launches will attempt to avoid daylight launches during weekends. In addition, beach closures will be posted conspicuously well before the date of scheduled launches.

#### **4.7.3 Cumulative Impacts**

To the extent that mission constraints allow launches from other facilities will be coordinated with current project to ensure that no cumulative impacts to land use will occur.

#### **4.7.4 No Project Alternative**

With the no project alternative, no additional beach closures will occur than already occur under present conditions. Therefore, the alternative will result in no significant impacts to land use.

### **4.8 Other Environmental Disciplines**

#### **4.8.1 Energy Resources**

Additional demands for energy resources to accommodate the additional launches are well within the normal power delivery system of VAFB and local area grids. As a consequence of this capacity, it is assumed that no significant impact will occur as a result of this action considered either alone or in combination with other reasonably foreseeable projects.

#### **4.8.2 Historic/Cultural Resources**

Due to the presence of an isolated chert flake identified during the Phase I surface survey at the north end of the new road area, monitoring by qualified archaeologists and Native Americans will be required during all ground disturbing activities associated with this project. Once engineering design for the road has been completed, CEVPC will prepare a scope of work for monitoring activities. If artifacts are found, construction will be temporarily halted and the quality of the resource will be evaluated. If appropriate, the road will be relocated to avoid the site. Based on this avoidance, no impacts to historically or culturally significant resources will result from this project.

#### **4.8.3 Aesthetics**

The addition of 670 meters (2,200 feet) of new roadway, a 60 by 90 meter (200 by 300 foot) parking lot, and the replacement of four temporary buildings with new structures will not cause significant impacts to the aesthetics of the area.

#### **4.8.4 Geologic Resources**

No significant impacts to geologic resources will be caused by the proposed action. A relatively small area of existing soil will be compacted and covered by asphalt for the new road and parking lot. However, the amount of area to be covered does not represent a significant impact on geologic resources.



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#### **4.8.5 Safety and Human Health**

Considerations for potential impacts to human health and safety have been discussed in the environmental documents listed in Section 1.2. Recently, considerations for health and safety from fuels transportation and accidental upset conditions were examined in the EA for the California Spaceport (USAF 1995). Because these considerations are basically the same for that facility as would apply to the current project and because the expected impacts from the California Spaceport were judged to be insignificant, impacts to this resource from this project are also assumed to be insignificant. The analysis and discussion is incorporated herein by reference.

#### **4.8.6 Cumulative Projects**

Because of the relative isolation of SLC-2W, no other major programs have been identified which would be expected to produce impacts of sufficient magnitude to yield cumulative impacts to these issue areas when considered with the proposed action.

#### **4.8.7 No Project Alternative**

With this alternative, potential impacts to cultural resources will not occur. There would not be an increase in accident potential with the no project alternative. No impacts to other issue areas were identified, therefore, there would be no difference in potential impacts from either the no project alternative or the proposed project. This alternative would result in no significant environmental impacts.

## **5.0 PERSONNEL INVOLVED IN THE PRODUCTION OF THIS DOCUMENT**

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#### U.S. Fish and Wildlife Service

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James Watkins, Threatened and Endangered Species, 1996

#### California Regional Water Quality Control Board

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#### California Coastal Commission

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## 5.2 Persons Responsible for the Production of the Document

Table 5-1 presents the persons responsible, years of experience, and areas of specialty for the production of the document.

**TABLE 5-1**  
**Persons Responsible for the Production of the Document**  
**(including years of experience)**

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Daniel Godden	Air Quality	22
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## 7.0 REFERENCES

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## **APPENDIX A**

### **Descriptions of Life History of Protected Species**



### Federal Endangered Species Act

The Federal Endangered Species Act (ESA) of 1973, as amended, extends legal protection to plants and animals listed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). The ESA authorizes the USFWS and NMFS to review proposed Federal actions to assess potential impacts to listed species. Section 7 of the ESA requires that a proposed major Federal action be evaluated by the USFWS and/or the NMFS for its potential to affect listed species or critical habitat. In compliance with the "Section 7 Consultation" process, the USFWS and/or NMFS evaluate a biological assessment prepared by the Federal agencies proposing the action and issues a "biological opinion" as to whether the proposed action is likely to jeopardize listed species or critical habitat.

Listed species are those fish, wildlife, or plants that have been determined to be threatened (likely to become endangered species within the foreseeable future throughout all or a significant portion of its range) or endangered (in danger of extinction throughout all or a significant portion of its range) under Section 4 of the ESA and which have been the subject of final regulation and listed in the Federal Register. There are three Federal groupings for classifying the status of sensitive plant and wildlife species:

- those that have been determined to be threatened,
- those that have been determined to be endangered,
- those that are candidates for listing as threatened or endangered. Species for which current information is insufficient to justify action but for which the USFWS or NMFS consider that listing may be appropriate are called species of special concern. These species were formerly called Category 2 candidate species. Candidate species and species of special concern are not afforded protection under the ESA, but are typically considered in the planning process of a major Federal action.

### Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) of 1972 offers the protection of the ESA to marine animals. The MMPA authorizes the National Oceanic and Atmospheric Administration (NOAA), NMFS, and the USFWS to review proposed Federal action to assess potential



impacts. Marine mammals are also included in Section 7 of the ESA and are part of the NMFS/USFWS consultation process.

#### California Endangered Species Act and Native Plant Protection Act

The California Endangered Species Act (CESA) of 1984 and the Native Plant Protection Act (NPPA) of 1977 are administered by the California Department of Fish and Game (CDFG). These acts address Rare, Endangered, or Candidate Species of plant and wildlife. Candidate Species are those that have been accepted by the state for review and potential inclusion to the list of Threatened or Endangered Species. The designation of "rare" applies to plants only, specifically those that are not threatened or endangered but could be, due to decreasing numbers or further restrictions to habitat. The CDFG utilizes and maintains the California National Diversity Data Base to track the status of these "sensitive" species as designated by state agencies. While the USAF is not obligated to protect state-listed threatened or endangered species, it is USAF policy to work cooperatively with the CDFG to do so.

#### **CALIFORNIA LEAST TERN** (USAF EA Atlas II, 1991)

##### **Life History**

The California least tern (*Sterna antillarum browni*) was classified as endangered by the USFWS in 1970 (35 FR 8495, June 2, 1970; 35 FR 16047, October 13, 1970). The tern is a migratory bird found in the California coastal region. The population decline of this bird can be attributed to its colonial nesting habitat along sandy beaches, areas easily disturbed by human activity. Development and recreational use of the California coast has led to the loss of nesting habitat. Foraging and roosting habitats have been destroyed by the dredging and filling of coastal wetlands (Wilbur, 1974a). Native predators like coyote and raccoon and introduced, non-native predators such as rats, cats, and red foxes also have contributed to the decline of this species. The breeding and nesting occurs between mid-April and the end of August (USAF, 1987).

The least tern is a migratory species that begins to arrive in the vicinity of the project area during late April and early May. Following breeding, they depart, and by late August and early September the species is virtually gone from the region (Lehman, 1982). Although the winter distribution of this subspecies is currently unknown, it is thought that the California least tern probably winters in southern Mexico and Central America (Wilbur, 1974a). Only sketchy information is available for winter sightings in Mexico (Zembal, 1984).

The least tern is a summer resident along the north coast of Santa Barbara county from the Santa Ynez River mouth north to the mouth of the Santa Maria River (Lehman, 1982). It is a rare but regular visitor to near shore habitats in the project area with a major breeding population just south of Purisima Point. The historical breeding range for the least tern was from the San Francisco Bay Area, California, south to southern Baja California, Mexico. The current breeding range along the California coast is similar to the historical one but with far fewer birds. (See Figure 3-4 main text).

### **Habitat Requirements**

Least terns are colonial nesters that require sandy areas free of nest predators (i.e., cats, crows, rats, raccoons, etc.). In the past, least terns have used sandy ocean beaches for nesting. Because of human activity in some beach areas, least terns have recently resorted to open areas of sand, dirt, or dried mud near lagoons or estuaries (USFWS, 1980). In populated areas such as San Diego Bay, least tern habitat is found next to runways (Lindberg Field, North Island).

Foraging surveys have been conducted on a site-specific basis within the Los Angeles-Long Beach Harbors (Massey and Atwood, 1982; 1984). Although the results of these surveys are not definitive, best available information indicates that foraging usually takes place primarily in shallow ocean water in the vicinity of the mouths of major rivers and within 2 miles of the nesting areas (Atwood and Minsky, 1983). They feed on small fish in nearshore ocean waters, estuaries, and associated freshwater ponds.

### **California Population**

During the last five years, the California least tern population has ranged from 954 breeding pairs in 1987, down from 1,046 pairs in 1984. The estimate for 1987 places the Santa Barbara County least tern population at 40 to 45 nesting pairs (Collins 1988). The Central California Coast breeding colonies located from the Guadalupe /Mussel Rock Dunes south to VAFB Surf location produced a total of 40 nests in 1989, 42 nests in 1990, 50 nests in 1991 and 55 nests in 1992 (Nature Conservancy, Perry 1992).

### **Presence in the Project Area**

The least tern has historically established nesting colonies on VAFB in the coastal foredunes at the mouths of the Santa Ynez and San Antonio Lagoons and at the dunes near Purisima Point. Two sites were observed on VAFB during the 1992 breeding season, one at Purisima Point and one located 1-2 kilometers north of Purisima Point (Nature Conservancy, 1992).

The terns also congregate at the mouth of the Santa Ynez River before migrating south. In northern Santa Barbara County and southern San Luis Obispo County, least terns have been recorded breeding at six localities during the 1980s: Pismo Beach, Oso Flaco Lake, Guadalupe Dunes near the mouth of the Santa Maria River, the mouth of the San Antonio Creek, Purisima Point and the mouth of the Santa Ynez River. In general, the nesting success at these six colonies in the project region has been low due to cold windy conditions prevalent at several of the dune locations (e.g., Guadalupe Dunes and Purisima Point), high water levels in the Santa Ynez river estuary, fluctuations in the availability of suitable prey, and presence of predators (e.g., coyotes, etc) at some of the colony sites.

Although the nesting colonies in Santa Barbara and San Luis Obispo counties are small (1-30 nesting pairs) and contain only approximately 5.8% to 12.3% of the species total estimated state-wide population, they are, nevertheless, significant in that they represent the only currently active areas between Ventura County and the San Francisco Bay. These colonies are important to the geographic breeding range of the species.

Despite the fact that the least tern nesting colony at the mouth of the Santa Ynez River is intermittent and quite small, large numbers of least terns have been recorded using this area following the nesting season. The Santa Ynez River apparently is a key area for feeding, roosting, and for post-fledgling congregation of adults and juveniles (Bevier, 1983). Preliminary observations from banding studies of least terns recorded northward movements of post-breeding birds from Venice Beach in southern California to the mouth of the Santa Ynez River. In most years, this area is used by 20 to 25 adults and fledglings for foraging and roosting following the breeding season.

The VAFB colony at Purisima Point had mixed success in 1992. With a total of 26 nests, 41 total eggs and a total count of 26 chicks, the fledgling count was only 4. The 1992 breeding season was greatly affected by the high rate of natural predation. A total of six nests were lost due to confirmed predation and another five were abandoned. The abandonment may have been due to such reasons as El Nino having a detrimental affect on the colonies in producing a lack of food. High winds of early June also were detrimental in covering nests with sand and possibly leading to the abandonment of nests by adult terns (Nature Conservancy, Perry 1992).

Data from 1978 through 1995 on the least tern nesting activity in the vicinity of the project area, are shown in Figure 3-6 (main text). The closest observed nesting area is located at least 2400 feet away from the launch point of the Delta II vehicle as shown in Figure 3-5 (main text). Figure 3-5 (main text) also details the launch vehicle flight path, typical wind direction, normal ground exhaust cloud and elevations for reference.

## WESTERN SNOWY PLOVER (USAF EA Atlas II, 1991)

### Life History

The Pacific coast population of the Western snowy plover (*Charadrius alexandrinus nivosus*) was federally listed as a threatened species on March 5, 1993. The breeding season of the coastal population extends from early March through late September. Based on recent population monitoring data the Western snowy plover is defined as those individuals that nest adjacent to or near tidal waters, and includes all nesting colonies on the mainland coast, peninsulas, off shore islands, adjacent bays and estuaries. The Pacific coast population is genetically isolated from interior western snowy plovers. The Pacific population breeds primarily on coastal beaches from Washington to southern Baja California, Mexico. A total of 20 plover breeding areas occur in coastal California and 8 of the areas, including Point Sal to Point Conception, which includes VAFB and Purisima Point, support 78 per cent of the California coastal population (Page et al, 1991). Statewide surveys between 1977 and 1980 indicated up to 10,200 breeding plovers in Washington, Oregon, California and Nevada. Recent surveys of these states (and also Utah) in 1988 and 1989 provided further information on the species distribution and abundance and showed a possible decline in numbers. In 1988 and 1989 the breeding population size in Washington, Oregon, California and Nevada was estimated to be about 7900 birds and in Utah about 1700. Most plovers (about 7700) were at interior sites, some (about 1900) were coastal. Although adult snowy plovers on the California coast experienced a decline from 1565 total adults in 1977-1980 (Page and Stenzel, 1981) to 1386 adults in 1989, the Vandenberg population from Point Sal to Point Conception was relatively unchanged with 119 adults in 1977-1980 and 116 adults in 1989 (Page et al., Spring 1991).

### Habitat Requirements

Snowy plovers frequent sandy beaches and the mouths of rivers for nesting and foraging (Lehman, 1982). In Santa Barbara County, winter populations are larger than summer populations due to an influx of birds from inland breeding localities. They have been observed nesting on sandy beaches along the mainland between Point Sal and Point Conception.

Nesting habitat is unstable and ephemeral as a result of unconsolidated soil characteristics influenced by high winds, storms, wave action and colonization by plants. Other less common nesting habitat includes salt pans, coastal dredged spoil disposal sites, dry salt ponds, and salt pond levees. Sand spits, dune backed beaches, unvegetated beach strands,

open areas around estuaries, and beaches at river mouths are the preferred coastal habitat for nesting. Snowy plovers forage on invertebrates in the wet sand and amongst surf-cast kelp within the intertidal zone; in dry, sandy areas above the high tide; or in salt pans, spoil sites, and along the edges of salt marshes (Federal Register, Vol. 58, No. 42 Mar 1993). The central coast provides suitable habitat for the snowy plover and surveys have been conducted at the Morro Bay area, Callendar-Mussel Rock Dunes, Point Sal to Point Conception (VAFB) and the Oxnard Lowlands. The latest survey for these four areas for the 1989 season accounted for 533 adults (G.W. Page, L.E. Stenzel, W.D. Shuford, 1990).

### **Presence in the Vicinity of the Project Area**

Snowy plovers have been systematically surveyed by observers on foot at VAFB from Minuteman Beach (adjacent to Point Sal) to Purisima Point since 1980. Point Reyes Bird Observatory (Page et al. 1991) have also conducted extensive studies throughout California and include the project area near Purisima Point. The regular periodic censuses have been augmented by intensive nesting-season monitoring since 1993. The western snowy plovers have been surveyed on a monthly basis for most years through 1992.

### **CALIFORNIA BROWN PELICAN (USAF EA Atlas II, 1991)**

#### **Life History**

The California brown pelican (*Pelecanus occidentalis californicus*) is designated as an endangered species by both the state of California and the federal government. During the late 1960s and early 1970s the brown pelican population in southern California suffered significant reproductive failures (USFWS, 1983). Eggshell thinning caused by pesticide contamination, in particular DDE and DDT, is believed to be the primary factor responsible for reproductive failures and subsequent declines observed in the brown pelican population in southern California (USFWS, 1983). Population fluctuations and reproductive success are also directly related to food availability (USAF EA Atlas II, 1991).

Brown Pelicans are a common year-round visitor to sandy beaches, nearshore waters, and protected bays and harbors in Santa Barbara County (Lehman, 1982; Webster et al., 1980). Their numbers are much reduced during the late winter and early spring, when most birds are at their nesting sites on islands off the coast of southern California and Mexico. Peak abundance occurs from July through December, when birds from Mexico migrate north. Between July and October, 25,000 to 35,000 pelicans occupy the near shore and coastal waters of the Santa Barbara County region (Briggs et al., 1983).

## **Habitat Requirements**

Brown pelicans generally forage over relatively shallow waters within 15 miles of shore but have been recorded up to 45 miles offshore during calm weather. Brown pelicans must return to land to roost each night. Preferred roosting and loafing areas are provided by offshore rocks and islands, river mouths with sandbars, breakwaters, pilings, and jetties (USFWS, 1983). Pelicans will often rest at a variety of sites during the day but will return to a major nocturnal roost site each night (Briggs et al., 1983). Large numbers of pelicans congregate regularly during the fall and winter at several roost sites in northern Santa Barbara County, including the mouth of the Santa Maria River, Point Sal, Purisima Point, and more rarely, the mouth of the Santa Ynez River. Other important roosting and loafing sites for brown pelicans in northwestern Santa Barbara County include the mouths of Shuman and San Antonio creeks on north VAFB, the rocky coastline and offshore rocks on South VAFB between Point Pedernales and Rocky Point, and on the boathouse breakwater on south VAFB (USAF, 1987, Nancy Reed, 1996). Pelicans are also known to frequent roosts on the northern Channel Islands, at the Santa Barbara Harbor, at the mouth of the Goleta Slough, at Point Mugu, and at the mouth of the Santa Clara River (Lehman, 1982; Briggs et al., 1983; Chambers Group, 1986).

Historically, California brown pelicans nested as far north as Monterey County, and south to the Tres Marias Islands off Nayarit, Mexico. More recently, the Pacific Coast breeding distribution of the brown pelican can be broken into three separate geographical groups: (1) the Channel Islands off southern California southward to Isla Isabela, (2) Isla Tres Marias off Nayarit, Mexico, and (3) Isla Ixtapa off Acapulco, Guerrero, Mexico (USFWS, 1983). As of 1981 the Southern California Bight brown pelican colonies constituted about 6.2% (3000 pairs) of the total west coast breeding population (48,000 pairs; Gress and Anderson, 1983). Despite an overall increase during the last 10 years, the California brown pelican has retained endangered species status because of its low reproductive success and its small U.S. breeding population. Brown pelicans have been shown to be particularly sensitive to environmental perturbations and to human disturbance (Anderson and Keith, 1980).

Since the early 1970's brown pelican nesting in California has been restricted to the Channel Islands. West Anacapa Island contains the only consistently active pelican colony. West Anacapa Island has been used for nesting by an increasing number of pelicans since 1980, and Scorpion Rock off Santa Cruz Island has been used only intermittently for nesting (Gress and Anderson, 1984). Nesting pairs and fledging rates have increased since the early 1970's, although large fluctuations have occurred (e.g., 62% mortality of young on Santa Barbara Islands; Lewis and Gress, 1987). Brown pelican breeding success and winter populations in

the Southern California Bight vary with the abundance of northern anchovy (Anderson et al., 1980, 1982). This is the primary reason for the large variability in numbers of nesting pairs at Anacapa and Santa Barbara Islands. Historically, pelicans in Southern California Bight have competed with commercial fisheries for anchovies (Anderson and Gress, 1984).

### **Presence in the Vicinity of the Project Area**

The California brown pelican does not nest or breed on VAFB, but is a transient visitor to the area.

### **SOUTHERN SEA OTTER (USAF EA Atlas II, 1991)**

#### **Life History**

The Southern sea otter (*Enhydra lutris*) is a federally-listed threatened species (USFWS 1990a) and listed as rare and protected by the state of California. The species ranges from Alaska to Baja California; however, only sparsely scattered individuals are found south of Avila Beach (ES, 1990). The sea otter breeding range did extend from near Santa Cruz to approximately Pismo Beach (USFWS, 1987; ES, 1990). But sea otters are consistently sighted along the coast of VAFB. Through introduction efforts and other actions, the sea otter has been observed as far south as the Santa Barbara Channel Islands (USAF EA ATLAS II, 1991). The sea otter inhabits the intertidal and shallow subtidal zones, foraging in both rocky and soft sediment communities, although its preference is for hard- bottom kelp associated regions. Sea otters are not dependent upon land, but can spend their entire lives at sea, usually within 0.5 miles of shore (Benech, 1981; Engineering-Science and SWRI, 1988).

In general, sea otters do not make the extensive migrations characteristic of other marine mammals; however, males are known to move throughout the California range, and even between the northern and southern extent of the species range (Estes and Jameson, 1983; ES, 1980). Females occupy a narrower range than males, possibly an average of 11 miles of coastline throughout their lives (USFWS, 1987; ES, 1990). Sea otters may live up to 20 years and have one young at least every two years (Daugherty, 1985; Engineering-Science and SWRI, 1988). Breeding and pupping occur throughout the year in Alaska and California (Kenyon, 1969; Vandever, 1970; Engineering-Science and SWRI, 1988); however, the predominant time for births in California is between January and March (USFWS, 1987; Engineering-Science and SWRI, 1988).

The historic abundance of otters in California was estimated at about 16,000 individuals (CDFG, 1976; Engineering-Science and SWRI, 1988). Extensive harvesting until the early 1900's resulted in range reduction and population decrease to less than 50 animals. With the prohibition of harvesting, range expansion has occurred, and recent population estimates are approximately 1,500 otters, excluding pups (MMS, 1985; Engineering-Science and SWRI, 1988). However, it appears that the sea otter population has not changed substantially since the early 1970's and that it may even have declined (USFWS, 1984; Engineering-Science and SWRI, 1988). The lack of population growth and range expansion has been attributed to an increase in mortality (MMS 1984m, 1985; Engineering-Science and SWRI, 1988), and CDFG suggested that accidental take in gill and trammel nets probably contributes significantly to the problem ) USFWS, 1985; Engineering-Science and SWRI, 1988). It has also been hypothesized that food may be limiting within the center of the species range (Ames et. al., 1983; Engineering-Science and SWRI, 1988)

### **Presence in the Vicinity of the Project Area**

The California Sea Otter, once abundant along the entire coast of California, generally does not extend in large populations south of San Luis Obispo. Isolated individuals, however, are sighted frequently along the coast of VAFB (Engineering-Science and SWRI, 1988; ES, 1990a). Sea otters have been the focus of recent reintroduction efforts in the southern Channel Islands (USAF EA Atlas II, 1991). In 1990, a small breeding colony was discovered in the vicinity of Purisima Point and was still intact in 1995. Some of the colony may have immigrated from San Nicolas Island (USFWS, 1992).





## **APPENDIX B**

### **Construction Emissions Calculations**



### Road Construction Emission Calculations

	SOx	CO	NOx	ROC	PM10	Hours	# of	# of	NOx	HC	PM10	SOx	CO
Equipment	Emission	Emission	Emission	Emission	Emission	per	days	vehicles	tons	tons	tons	tons	tons
	Factor	Factor	Factor	Factor	Factor	day							
Truck: Dump (Gasoline) *	0.0234	17	0.412	0.7478	0.0248	8	20	3	0.099	0.179	0.006	0.006	4.080
Truck: Asphalt (Gasoline) *	0.0234	17	0.412	0.7478	0.0248	8	10	3	0.049	0.090	0.003	0.003	2.040
Asphalt Paver (Diesel)	0.143	0.675	1.691	0.183	0.1334	8	10	1	0.068	0.007	0.005	0.006	0.027
Crawler Tractor (Diesel)	0.090	3.59	1.269	0.218	0.1306	8	20	2	0.203	0.035	0.021	0.014	0.574
Grader (Diesel)	0.086	0.151	0.713	0.052	0.0586	8	20	1	0.057	0.004	0.005	0.007	0.012
Loader (Diesel)	0.182	0.572	1.89	0.291	0.1651	8	20	1	0.151	0.023	0.013	0.015	0.046
Truck: 1/2 TON (Gasoline) *	0.0234	17	0.412	0.7478	0.0248	8	20	1	0.033	0.060	0.002	0.002	1.360
Compressor (Gasoline)	0.0234	17	0.412	0.7478	0.0248	8	5	1	0.008	0.015	0.000	0.000	0.340
Truck: Concrete (Diesel) **	0.182	0.572	1.89	0.291	0.1651	8	5	2	0.076	0.012	0.007	0.007	0.023
Truck: Water (Gasoline) *	0.0234	17	0.412	0.7478	0.0248	8	20	1	0.033	0.060	0.002	0.002	1.360
Total									0.777	0.485	0.064	0.061	9.862

Note: The emission factors are in the units of pounds/hr.

\* : The emission factors for a backhoe were used for calculating the gasoline truck's emissions, since the truck's horse power is in the same range as a backhoe (120 HP to 200 HP).

\*\* : The emission factors for a loader were used for calculating the diesel truck emissions, since the diesel truck horse power is in the same range as a loader (> 300 HP).

### Fugitive Dust Emission Calculations

Roads	Length (ft)	Width (ft)	Area (acres)	# Months	Dust Emission Factor	Uncontrolled Emissions (tons)	Controlled Emissions (tons)
Road 1	1800	24	0.9919	1	0.432	0.4285	0.2142
Road 2	400	24	0.2204	1	0.432	0.0952	0.0476
Parking Lot	200	300	1.3776	1	0.432	0.5951	0.2976
Modular Buildings	150	150	0.5166	1	0.432	0.2232	0.1116
Total						1.3420	0.6710

Notes : 1) The dust emission factort for PM10 is 0.36 fraction of the emission factor for TSP (1.2 tons/acres/month) according to the AP-42 chapter 13.2.2-3.

2) Twice per day watering is assumed to control fugitive dust by 50%.

B-2

### ROC Emission Calculations from Asphalt Paving

Roads	Length (ft)	Width (ft)	Asphalt Depht (ft)	Volume (cubic feet)	Weight of Asphalt (tons)	Emission Factor (lbs HC/ton)	Emissions HC (tons)	Emissions ROC (tons)
Road 1	1800	24	0.33	14400	1036.8	0.04	0.0207	0.0202
Road 2	400	24	0.33	3200	230.4	0.04	0.0046	0.0045
Parking Lot	200	300	0.33	20000	1440.0	0.04	0.0288	0.0281
Total							0.0541	0.0528

Notes : 1) The 144 lb/ft<sup>3</sup> factor was used in converting the volume of the asphalt to the weight of the asphalt.

2) For asphalt, ROC = 97.6% of HC emissions.

## **APPENDIX C**

### **Ancillary Activities Emission Calculations**



## Delta II Launch -- Motor Vehicle Emissions

### Transport within Santa Barbara County

Transport Activity	From	To	Total Distance (miles)	Number of Trucks	Emissions (pounds per Delta)				
					TOG	CO	NOx	PM10	SOx
Main Engine @ 45 mph	Co. Line	VAFB	75	1	0.30	1.12	2.06	0.37	0.07
2nd Stage @ 45 mph	Co. Line	VAFB	75	1	0.30	1.12	2.06	0.37	0.07
3rd Stage @ 45 mph	Co. Line	VAFB	75	1	0.30	1.12	2.06	0.37	0.07
Farings @ 45 mph	Co. Line	VAFB	75	1	0.30	1.12	2.06	0.37	0.07
SRMs @ 45 mph	Co. Line	VAFB	75	9	2.66	10.10	18.50	3.35	0.67
Payload @ 45 mph	Co. Line	VAFB	75	1	0.30	1.12	2.06	0.37	0.07
Payload @ 10 mph	VAFB	VAFB	9	1	0.10	0.51	0.34	0.04	0.01
Payload @ 10 mph	VAFB	SLC-2W	1.5	1	0.02	0.08	0.06	0.01	0.00
TOTAL per luanch (pounds)					4	16	29	5	1
TOTAL for 8 luanches (tons)					0.017	0.065	0.117	0.021	0.004

HDD Emission Factors (grams/mile)					
Speed	TOG	CO	NOx	PM10	SOx
10	5.25	25.61	17.00	2.25	0.45
45	1.79	6.79	12.43	2.25	0.45



## Delta II Launch -- Motor Vehicle Emissions

### Transport from Manufacturing Location

Transport Activity	From	To	Total Distance (miles)	Number of Trucks	Emissions (pounds per Launch)				
					TOG	CO	NOx	PM10	SOx
Main Engine @ 45 mph	CO-FLA	VAFB	5000	1	20	75	137	25	5
2nd Stage @ 45 mph	CO-FLA	VAFB	5000	1	20	75	137	25	5
3rd Stage @ 45 mph	SoCAL	VAFB	150	1	1	2	4	1	0
Farings @ 45 mph	CO	VAFB	1200	1	5	18	33	6	1
Solid Rocket @ 45 mph	UT	VAFB	1000	9	36	135	247	45	9
Payload @ 45 mph	AZ	VAFB	500	1	2	7	14	2	0
Payload @ 10 mph	VAFB	VAFB	9	1	0.10	0.51	0.34	0.04	0.01
Payload @ 10 mph	VAFB	SLC-2W	1.5	1	0.02	0.08	0.06	0.01	0.00
Total per luanch (pounds)					82	313	572	103	21
Total for 8 luanches (tons)					0.330	1.251	2.287	0.414	0.083

HDDT Emission Factors (grams/mile)					
Speed	TOG	CO	NOx	PM10	SOx
10	5.25	25.61	17.00	2.25	0.45
45	1.79	6.79	12.43	2.25	0.45

### VOC Emissions From Paints and Solvents

D.P.M.#	Description	Used	Units	VOC g/l	Conversion Factor	CF Units	VOC Emissions	Units	Remarks
517	naphtha	0.25	gal	970	3.785	l/gal	918	gram	Assume 100% VOC
540	toluene	0.50	gal	867	3.785	l/gal	1641	gram	Not photochemically reactive
2605-1	1,1,1 trichloroethane	0.50	gal	0	3.785	l/gal	0	gram	
2232	primer	0.50	gal	337	3.785	l/gal	638	gram	
2384-1	thread primer	3.50	fl.oz.	68	0.02957	l/fl.oz.	7	gram	
3202-1	primer	25.00	fl.oz.	741	0.02957	l/fl.oz.	548	gram	
3392-1	primer	2.00	fl.oz.	90	0.02957	l/fl.oz.	5	gram	
4958-1	primer	1.12	gal	741	3.785	l/gal	3141	gram	
8059	primer	16.00	fl.oz.	340	0.02957	l/fl.oz.	161	gram	
3889	coating	2.00	fl.oz.	547	0.02957	l/fl.oz.	32	gram	
4699	coating	32.00	fl.oz.	640	0.02957	l/fl.oz.	606	gram	
4976-17925	coating	4.00	fl.oz.	640	0.02957	l/fl.oz.	76	gram	Assume same as 4699
8526-1	coating	4.00	gal	256	3.785	l/gal	3876	gram	Assume same as 4958-1
#5279	rustoleum blk	16.00	fl.oz.	741	0.02957	l/fl.oz.	351	gram	
1445-37038	blk ink	8.00	fl.oz.	713	0.02957	l/fl.oz.	169	gram	Assume 100% VOC
3029	red ink	13.00	wt.oz.	265	28.3	gram/wt.oz.	368	gram	
3267-31136	red ink	30.00	gram	405			30	gram	
3267-3708	blk ink	200.00	gram	405			200	gram	
3267-3785	wht ink	30.00	gram	405			30	gram	Assume 100% VOC
SUBTOTAL							28	lb	Per launch
							0.014	ton	Per launch
							0.113	ton	For 8 launches
530	isopropanol	30.00	gal	786	3.785	l/gal	89250	gram	Assume 100% VOC
535	methyl ethyl ketone	8.25	gal	807	3.785	l/gal	25200	gram	
4964-1	freon-113	15.00	gal	1564	3.785	l/gal	88796	gram	Assume 100% VOC
SUBTOTAL							0.224	ton	Contingency operation
TOTAL							0.337	ton	Annual

Note: Assumes that everything "used" is emitted to air

PROJECT NAME: Commuters for Delta Launches Date: 01-09-1996

Project Area: South Central Coast (Santa Barbara/San Luis Obispo)

Analysis Year: 1996 Temperature (F): 70 Season: Summer

EMFAC Version: Emfac7f1.1(12/93)

#### Summary of Land Uses:

Unit Type	Trip Rate	Size	Tot Trips
Hypothetical Home	5.0/Unit	20	100

(Comment: 60 people per day;  
50 cars--20% ride share;  
1 round trip per day)

#### Vehicle Assumptions:

##### Fleet Mix:

(Comment: Assume only light duty vehicles)

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Duty Autos	81.6	2.4	96.9	0.6
Light Duty Trucks	18.4	1.3	97.8	0.9
Medium Duty Trucks	0.0	2.8	97.2	0.0
Heavy Duty Trucks	0.0	28.7	71.3	N/A
Heavy Duty Trucks	0.0	N/A	N/A	100.0
Motorcycles	0.0	100.0	N/A	N/A

#### Travel Conditions:

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Trip Length	20.0	0.0	0.0	0.0	0.0
% Started Cold	88.3	40.2	58.3	77.4	27.2
Trip Speed	25	30	35	25	25
Percent Trip	100.0	0.0	0.0		

#### Project Emissions Report in Lb/Day:

Unit Type	HC	CO	NOx
Hypothetical Home	4.09	29.46	2.71
TOTALS	4.09	29.46	2.71

#### Project Emissions Report in Lb/Day (Continued)

Unit Type	FUEL (Gal.)	PM10	SOx
Hypothetical Home	92.7	0.41	0.26
TOTALS	92.7	0.41	0.26

## **APPENDIX D**

### **Chemical and Physical Analysis of Ignition Pulse Suppression/Pad Washdown Water from SLC-2W Launch November 1989**

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**Enseco - CRL / Central Coast**

2325 Skyway Drive, Suite K • Santa Maria, California 93455  
(805) 922-2776 • FAX: (805) 922-5897

DOHS Certification #188

## L A B O R A T O R Y      R E P O R T

TO: EG & G VOD  
P.O. Box 5338  
VAFB, CA 93437

SAMPLE NUMBER: 4413-1  
DATE SAMPLED: 11/18/89  
DATE RECEIVED: 11/21/89  
DATE REPORTED: 11/30/89  
SAMPLE TYPE: Liquid

ATTN: Dennie Bernier

PROJECT NAME: NASA/Delta II Launch/SLC-II

SAMPLE DESCRIPTION: Post Launch Pre-Pad Wash - GT-89-1010, GT-89-1011, GT-89-1012,  
GT-89-1013

Sample Preparation Method for Metals: EPA 3010

CONSTITUENTS	RESULTS	UNITS	EPA METHOD
Cadmium	0.009	mg/l	7130
Chromium, Total	ND(0.05)	mg/l	7190
Copper	0.05	mg/l	7210
Lead	0.1	mg/l	7420
Nickel	ND(0.05)	mg/l	7520
Silver	ND(0.02)	mg/l	7760
Zinc	6.4	mg/l	7950
Flash Point	> 200	deg F	1010

*Scott E. Arnold*  
Reviewed & Approved  
Laboratory Manager

D-1

The Report Cover Letter is an integral part of this report.

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DOHS Certification #188

## L A B O R A T O R Y      R E P O R T

TO: EG & G VOD  
P.O. Box 5338  
VAFB, CA 93437

SAMPLE NUMBER: 4413-2  
DATE SAMPLED: 11/18/89  
DATE RECEIVED: 11/21/89  
DATE REPORTED: 11/30/89  
SAMPLE TYPE: Liquid

ATTN: Dennie Bernier

PROJECT NAME: NASA/Delta II Launch/SLC-II

SAMPLE DESCRIPTION: Post Launch Post-Pad Wash - GT-89-1014, GT-89-1015, GT-89-1016,  
GT-89-1017

Sample Preparation Method for Metals: EPA 3010

CONSTITUENTS	RESULTS	UNITS	EPA METHOD
Cadmium	0.007	mg/l	7130
Chromium, Total	ND(0.05)	mg/l	7190
Copper	0.04	mg/l	7210
Lead	ND(0.05)	mg/l	7420
Nickel	ND(0.05)	mg/l	7520
Silver	ND(0.02)	mg/l	7760
Zinc	5.9	mg/l	7950
Flash Point	> 200	deg F	1010

D-2

*Scott Z. Arnold*  
Reviewed & Approved  
Laboratory Manager

The Report Cover Letter is an integral part of this report.

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## Enseco - CRL / South Coast

7440 Lincoln Way • Garden Grove, CA 92641  
 (714) 898-6370 • (213) 598-0458 • (800) LAB-I-CRL  
 FAX: (714) 891-5917

## Laboratory Report

ENSECO CRL SANTA MARIA  
 2325 SKYWAY DRIVE, SUITE K  
 SANTA MARIA, CA 93455  
 ATTN: MS. CAROL MASUDA

Analysis No.: G-8932606-001  
 Date Sampled: 18-NOV-1989  
 Date Sample Rec'd: 22-NOV-1989  
 Date Analyzed: 22-NOV-1989  
 Sample Type: LIQUID

Project: (4413) EG & G VOD  
 Sample ID: (4413-01) POST-LAUNCH, PREPAD WASH

## Purgeable Organics, EPA 624

Units: ug/L

Parameter	Result	Blank	Detection Limit
Chloromethane	ND	ND	10
Bromomethane	ND	ND	10
Vinyl Chloride	ND	ND	10
Chloroethane	ND	ND	10
Methylene Chloride	ND	ND	5
Acetone	ND	ND	10
Carbon Disulfide	ND	ND	5
Trichlorofluoromethane	ND	ND	5
1,1-Dichloroethene	ND	ND	5
1,1-Dichloroethane	ND	ND	5
trans-1,2-Dichloroethene	ND	ND	5
Chloroform	ND	ND	5
1,2-Dichloroethane	ND	ND	5
2-Butanone	ND	ND	10
1,1,1-Trichloroethane	ND	ND	5
Carbon Tetrachloride	ND	ND	5
Vinyl Acetate	ND	ND	10
Bromodichloromethane	ND	ND	5
1,2-Dichloropropane	ND	ND	5
trans-1,3-Dichloropropene	ND	ND	5
Trichloroethene	ND	ND	5
Dibromochloromethane	ND	ND	5
1,1,2-Trichloroethane	ND	ND	5
Benzene	ND	ND	5
cis-1,3-Dichloropropene	ND	ND	5
2-Chloroethylvinyl ether	ND	ND	10
Bromoform	ND	ND	5
4-Methyl-2-pentanone	ND	ND	10
2-Hexanone	ND	ND	10
Tetrachloroethene	ND	ND	5
1,1,2,2-Tetrachloroethane	ND	ND	5
Toluene	ND	ND	5
Chlorobenzene	ND	ND	5
Ethylbenzene	ND	ND	5
Styrene	ND	ND	5
Xylenes, Total	ND	ND	5



**Enseco - CRL / South Coast**

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 FAX: (714) 891-5917

**Laboratory Report**

ENSECO CRL SANTA MARIA  
 2325 SKYWAY DRIVE, SUITE K  
 SANTA MARIA, CA 93455  
 ATTN: MS. CAROL MASUDA

Analysis No.: G-8932606-002  
 Date Sampled: 18-NOV-1989  
 Date Sample Rec'd: 22-NOV-1989  
 Date Analyzed: 22-NOV-1989  
 Sample Type: LIQUID

Project: (4413) EG & G VOD  
 Sample ID: (4413-02) POST-LAUNCH, POST-PAD WASH

**Purgeable Organics, EPA 624**

Units: ug/L

Parameter	Result	Blank	Detection Limit
Chloromethane	ND	ND	10
Bromomethane	ND	ND	10
Vinyl Chloride	ND	ND	10
Chloroethane	ND	ND	10
Methylene Chloride	ND	ND	5
Acetone	ND	ND	10
Carbon Disulfide	ND	ND	5
Trichlorofluoromethane	ND	ND	5
1,1-Dichloroethene	ND	ND	5
1,1-Dichloroethane	ND	ND	5
trans-1,2-Dichloroethene	ND	ND	5
Chloroform	ND	ND	5
1,2-Dichloroethane	ND	ND	5
2-Butanone	ND	ND	10
1,1,1-Trichloroethane	ND	ND	5
Carbon Tetrachloride	ND	ND	5
Vinyl Acetate	ND	ND	10
Bromodichloromethane	ND	ND	5
1,2-Dichloropropane	ND	ND	5
trans-1,3-Dichloropropene	ND	ND	5
Trichloroethene	ND	ND	5
Dibromochloromethane	ND	ND	5
1,1,2-Trichloroethane	ND	ND	5
Benzene	ND	ND	5
cis-1,3-Dichloropropene	ND	ND	5
2-Chloroethylvinyl ether	ND	ND	10
Bromoform	ND	ND	5
4-Methyl-2-pentanone	ND	ND	10
2-Hexanone	ND	ND	10
Tetrachloroethene	ND	ND	5
1,1,2,2-Tetrachloroethane	ND	ND	5
Toluene	ND	ND	5
Chlorobenzene	ND	ND	5
Ethylbenzene	ND	ND	5
Styrene	ND	ND	5
Xylenes, Total	ND	ND	5

## **APPENDIX E**

### **Delta II Acid Deposition Test Report**





## DEPARTMENT OF THE AIR FORCE

30TH SPACE WING (AFSPACECOM)

9 Nov 95

MEMORANDUM FOR 30 CES/CEVPP  
ATTENTION: JIM JOHNSTON

FROM: 30 AMDS/SGPB  
338 South Dakota Street (Bldg 15848)  
Vandenberg AFB CA 93437-6307

SUBJECT: Delta II Acid-Deposition Test Report - INFORMATION MEMORANDUM

### Abstract

On 4 Nov 95 a Delta II Launch Vehicle was launched from SLC-2W on Vandenberg Air Force Base. The launch was monitored for indications of pH changes in the surrounding air caused by hydrogen chloride (HCl) vapors or deposition. No changes in pH were indicated outside of a 100 yard radius from the launch vehicle.

### Objective

The objective of this test was to comply with the requirement indicated in the United States Fish and Wildlife Service (USFWS) 12 Apr 93 Biological Opinion (atch 1) pursuant to section 7 of the Endangered Species Act. In paragraph 1.b, under Terms and Conditions, the USFWS states: "Exhaust plume deposition shall be monitored on the first available launch from SLC-2W and 576E. The information shall be made available to the Service." In an 8 Nov 93 USFWS letter (atch 2) pertaining to the 12 Apr 93 Biological Opinion, the letter states in part: "..... we believe that monitoring the spread of acidic vapor over the ground surface coupled with simple splatter pattern detection will be sufficient to satisfy the intent of Term and Condition 1.b."

### Background

The suggested format of acidic vapor and splatter pattern detection have been used in two past launches. The black construction paper used to detect a splatter pattern failed to register any discernible results. Some of the concepts for monitoring for splatter pattern assumed a "wet" launch, that is, that like in the Titan launches, water is injected into the exhaust to act as a sound and heat suppression. This is not the case in all launches. Acidic vapors were monitored using pH paper to register pH changes occurring in the surrounding air resulting from HCl formation from the rocket motor exhaust. Results from the previous two launches showed pH values ranging from 1 to 7, as a function of distance from the launch pad. This proved the presence of acidic vapors, but there was no correlation drawn between the pH results and the airborne concentrations. For the launch of the Delta II launch vehicle on 4 Nov 95, the following changes were made to the monitoring procedure in order to address some of these concerns. Specifically, larger strips of pH paper were used so that acid droplet deposition could be seen and differentiated from the pH changes induced by vapor. Lab tests conducted at Bioenvironmental Engineering showed that acidic vapor produced a "haze" effect (no distinct lines, just color differences, between affected and non-affected areas) while droplets produced "water marks" or stain lines. The water marks showed up even when the pH values from the vapor and droplet were the same. Black construction paper was tested and not found to be a good indicator of acid droplet presence. This monitoring was felt to be more responsive to the requirements of the USFWS 12 Apr 93 Biological Opinion by eliminating some of the questions as why no splatter patterns had been seen to date.

GUARDIANS OF THE HIGH FRONTIER

## Procedure

### I. Pre-launch

Forty-seven (47) sampling stations were set up in a grid pattern south of the launch vehicle. Each sampling station consisted of a strip of pH paper, 6 inches long by 1 inch wide. Each of the test strips were facing the launch vehicle. Of the 47, one test strip was attached to a metal fence, four others were attached to utility poles, and all the remaining strips were attached to wooden lathe. The strips' height above the ground ranged from 3 to 5 feet.

The grid was placed to the south of the launch vehicle because the weather forecast for Saturday had winds at launch time coming from 350 degrees (10 degrees West of True North). The grid formation was set to capture the ground cloud as it moved with the wind. Also the grid was laid out to allow for wind direction changes of up to  $\pm 40$  degrees. The depth of the grid was based on information from the 2 May 94 Det 9, SMC/ENF Memorandum (arch 3) which discusses the Taurus acid plume testing. The memorandum shows that the Taurus launch produced pH changes within a radius of 50 yards in all directions from the launch vehicle, but only caused significant pH changes beyond the 50 yard radius in the direction of the wind. The changes were not evident passed 300 yards. Also, since the only significant pH data would occur in the direction of the wind, the concentrated grid would provide better sensitivity and interpolation of the results than previously achieved with the radial pattern of sampling sites used in the previous two tests.

Because the purpose of the monitoring was to determine effects on plant and animal life away from the immediate vicinity of the pad, sampling stations were placed at a distance starting 100 yards away from the launch vehicle and approximately 30 yards from the edge of the launch pad pavement. The sampling stations were placed 25 yards away from each other in a North-South direction and 50 yards apart in the East-West direction. The grid consisted of 6 columns in the North-South direction, by 8 columns in the East-West direction. The terrain on which the sampling stations were placed is covered with vegetation and consists of many small gullies and hills.

### II. Post-launch

After the launch vehicle was launched, all the pH strips would be examined for change in pH caused by vapors or droplet deposition. Thus, the strips could discern whether any pH change was a result of acidic vapors or droplet deposition or both.

## Results

No pH changes occurred on any of the test strips and there was no indication of acid deposition. The ground cloud stayed within the confines of the launch pad, then rose because of the heating to 500 to 600 feet. At that altitude, the cloud stabilized and moved in a southerly direction at a barely discernible speed.

Launch vehicle: Delta II  
Launch date: 4 Nov 95  
Launch time: 0622  
Launch site: SLC-2W

Wind direction: calm conditions  
Wind speed: calm conditions  
Humidity: 93 %  
Temperature: 48 - 50 degrees (Fahrenheit)

## Discussion

The data collected shows that no hydrogen chloride vapors or deposition occurred within the testing area south of the launch site. The launch releases were confined to the launch pad and the lofted plume. No significant impact on the surrounding plant and animal life occurred from acidic vapors or droplets because the ground cloud remained

within the boundaries of the launch pad, the majority of which is pavement or launch-related buildings and the lofted plume stayed aloft until it was dispersed.

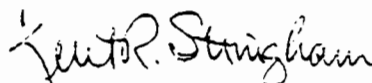
### Conclusions and Recommendations

For this Delta II launch, the calm winds resulted in no pH changes outside a 100 yard radius.

If pH changes had occurred within the grid of sampling stations for this launch, no knowledge on the concentration or amount of hydrogen chloride could be drawn solely from changes in the air's pH. No correlation can be drawn between change in pH and concentration of hydrogen chloride. The only knowledge this test can provide is the extent and degree of pH change and whether this pH change was caused by acidic vapors or deposition from the ground cloud.

As stated, in part, in USFWS 12 Apr 93 Biological Opinion, Analysis of Impacts; "Acid deposition occurring as a result of the generation of a ground cloud could potentially burn birds, eggs, or chicks if the cloud reaches any nesting birds." Since this is the USFWS's concern pertaining to the acid deposition from the launch emissions, then testing should be performed in the future that will better indicate whether future Delta II launches cause the impact they are concerned about. Pre and post launch visual inspections should be performed to determine if the launch releases are capable of burning the surrounding vegetation. Before and after soil pH testing is also recommended. Even though SLC-2W is located approximately 2400 feet (see enclosed map within USFWS 12 Apr 93 Biological Opinion) from a California least tern and western snowy plover nesting site, 30 CES/CEVPN (Natural Resources) should consider implementing future testing that will show the impact upon birds and eggs (which are suitable for scientific testing) that are placed within exposure range to Delta II launch emissions.

Also, as a result of the review of past monitoring and the experimenting conducted by Bioenvironmental Engineering, an interesting question is raised on the cause of the pH gradation seen in the past monitoring. In the lab, the acid vapors were consistently of the same pH even when the vapor was dispersed in air and measured at a greater distance from the source or when diluted (up to 1:30) with water. Only after a buffering compound was introduced did the pH of the vapors show graded changes. The pH would then increase, as would be expected from standard chemistry, as a direct result of the amount of buffering compound used. The possibility of the acidic vapors being some how buffered as they move down wind may deserve further evaluation. Also, lab tests with acid vapors and buffering compounds generated white clouds during the time the acid /buffer reactions were taking place. The white clouds would last for considerable periods of time, decreasing in opacity/density as the buffering compound was used up. This was indicated by the fact that the pH of the buffered cloud would keep changing (it started out at the pH of the buffering compound and would stabilize at a lower pH) until the cloud began to be significantly less dense.



KENT R. STRINGHAM, LT COL, USAF, BSC  
Chief, Bioenvironmental Engineering Services

### Attachments

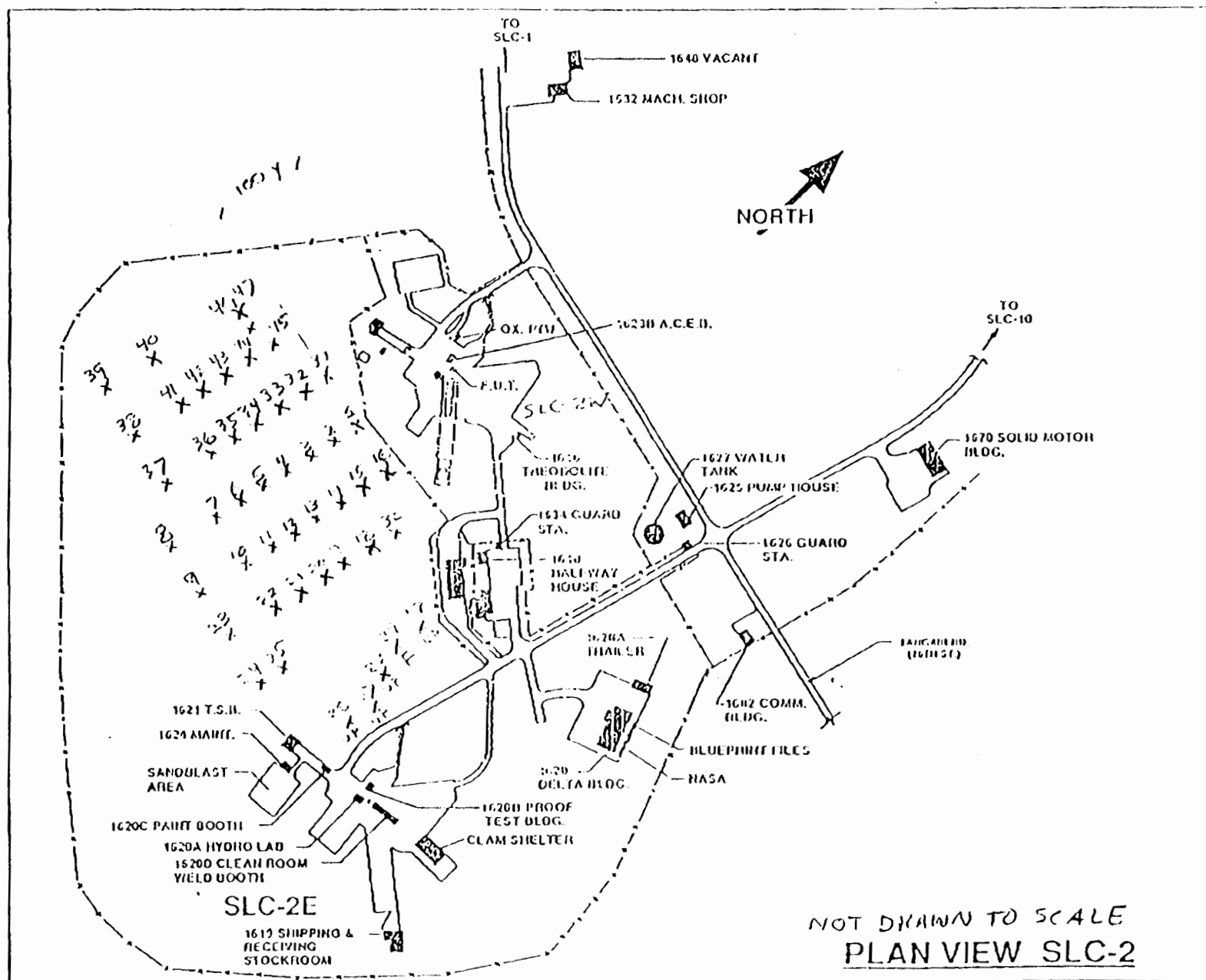
1. 12 Apr 93 USFWS Biological Opinion
2. 8 Nov 93 USFWS ltr
3. 2 May 94 Det 9 Memorandum

cc: 30 CES/CEV (Jon Ericson)  
Det 9 (Vo Truong)

**TABLE 1: ACID-DEPOSITION TEST - pH RESULTS**

<b>Sampling Site #</b>	<b>pH (0 - 14)</b>	<b>Cause of pH Change (Vapor/Deposition)</b>
1	no pH change detected	Not Applicable
2	no pH change detected	Not Applicable
3	no pH change detected	Not Applicable
4	no pH change detected	Not Applicable
5	no pH change detected	Not Applicable
6	no pH change detected	Not Applicable
7	no pH change detected	Not Applicable
8	no pH change detected	Not Applicable
9	no pH change detected	Not Applicable
10	no pH change detected	Not Applicable
11	no pH change detected	Not Applicable
12	no pH change detected	Not Applicable
13	no pH change detected	Not Applicable
14	no pH change detected	Not Applicable
15	no pH change detected	Not Applicable
16	no pH change detected	Not Applicable
17	no pH change detected	Not Applicable
18	no pH change detected	Not Applicable
19	no pH change detected	Not Applicable
20	no pH change detected	Not Applicable
21	no pH change detected	Not Applicable
22	no pH change detected	Not Applicable
23	no pH change detected	Not Applicable
24	no pH change detected	Not Applicable
25	no pH change detected	Not Applicable
26	no pH change detected	Not Applicable
27	no pH change detected	Not Applicable
28	no pH change detected	Not Applicable
29	no pH change detected	Not Applicable
30	no pH change detected	Not Applicable
31	no pH change detected	Not Applicable
32	no pH change detected	Not Applicable
33	no pH change detected	Not Applicable
34	no pH change detected	Not Applicable
35	no pH change detected	Not Applicable
36	no pH change detected	Not Applicable
37	no pH change detected	Not Applicable
38	no pH change detected	Not Applicable
39	no pH change detected	Not Applicable
40	no pH change detected	Not Applicable
41	no pH change detected	Not Applicable
42	no pH change detected	Not Applicable
43	no pH change detected	Not Applicable
44	no pH change detected	Not Applicable
45	no pH change detected	Not Applicable
46	no pH change detected	Not Applicable
47	no pH change detected	Not Applicable

ന







## **APPENDIX F**

### **Comments and Responses to Public Review of Administrative EA**



# COORDINATION AND FILE COPY

15 MAY 1996

MEMORANDUM FOR ENSR CONSULTING AND ENGINEERING  
ATTN: MR BILL GORHAM  
1220 AVENIDA ACASO  
CAMARILLO CA 93012

FROM: 30 CES/CEVP  
806 13th Street, Ste 116  
Vandenberg AFB CA 93437-5242

*RESUBMIT*  
*11 JUNE 96*  
*- PER REQUEST*  
*XX*

## Responses to Public Review Comments

SUBJECT: Preliminary Final Environmental Assessment (EA) for Launch Rate Increase for Delta II Program at Vandenberg Air Force Base (VAFB), California

- CV-1 1. The subject draft EA, dated March 1996, has been reviewed by the public, regulatory agencies, and the Environmental Impact Analysis Process (EIAP) Subcommittee. We are forwarding the following comments:
- CV-1a a. General. Response to Comments. Please assign a tracking number to each comment submitted, and provide your specific corresponding responses (text) for evaluation by this office, prior to finalization of EA.
- CV-1b b. Sec 1.5, pg 1-7, para 5, bullets #1 & #2. Are these mitigation measures that MDA must take, or are they on-going mitigation implemented by VAFB authorities? Please clarify.
- CV-1c c. Sec 4.2.2.2, pg 4-10, para 3, ln 6. The IWTP evaporation ponds filled to overflowing in 1994-95, and nearly overflowed again in 1995-96 due to wastewater deliveries and rainwater contribution. In view of this, please revise last sentence.
- CV-2 2. This concludes our comments. Additional comments are provided in the 10 attachments. Should you have any questions, please contact Mr Garry E. Sanchez at (805)734-8232, extension 6-2814.

- CV-1a a Tracking numbers have been assigned to each comment. Tracking numbers correspond to the attachment number assigned to each document at the bottom of the cover letter.
- CV-1b b The mitigation measures are on-going measures VAFB is taking. They are not a part of mitigation for this project. They were included in the EA as measures taken to protect terns and plovers. Due to the comments from the reviewers, these mitigation measures have been removed from the EA document.
- CV-1c c The text has been revised to include the information provided. Contingencies to handle the IPS water in the event of a repeat event have been included.
- CV-2 2 Comment noted.

ORIGINAL SIGNED E

KARL E. KNEELING, P.E.  
Chief, Planning  
Environmental Management

*ALSO ADDED:*  
*11. REVISED DRAFT COMMENTS*  
*12. 30 CES/CEVCR COMMENTS*  
*13. 30 CES/CEVPC COMMENTS*

### Attachments:

- 30 CES/CEVPN Comments, 26 Apr 96
- 30 CES/CEVCR Comments, 10 Apr 96
- 30 CES/CEVPC Comments
- 30 CES/CEVCC Statement
- 30 CES/CECB Comments, 6 May 96
- 30 RANS/DOWN Comments, 7 May 96
- Dept of Transportation Comments, 13 May 96
- SBC Planning & Development Comments, 15 Apr 96
- SBC APCD Comments, 22 Apr 96
- SSI Comments, 9 May 96

RETURN TO:	FUNC ADDRESS SYM	ORIGINATOR'S NAME AND GRADE	PHONE NO	TYPIST'S INITIALS	DATE TYPED	FILE
	30 CES/CEV	Karl E. Kneeling			15 MAY 1996	



DEPARTMENT OF THE AIR FORCE  
30TH SPACE WING (AFSPACECOM)

MEMORANDUM FOR ENVIRONMENTAL IMPACT ANALYSIS PROCESS SUBCOMMITTEE

FROM: 30 CES/CEVPP

SUBJECT: Environmental Assessment (EA), for Launch Rate Increase for Delta II Program at Vandenberg Air Force Base (VAFB), California

1. Attached for your review and comment is the subject EA (preliminary final) dated March 1996, which proposes an increase in the launch rate from two to ten launches annually (maximum), at SLC-2W beginning in 1996.

2. Please ensure that your comments have been adequately addressed in the current document. If you concur with the document as proposed, please provide your recommendation for approval to the base Environmental Protection Committee (EPC) in the endorsement below and return your response NLT 7 May 1996. Should you have any questions, please contact Mr Garry E. Sanchez at (805) 734-8232, extension 6-2814.

F-2

GARRY E. SANCHEZ, GS-12  
Program Planning  
Environmental Management

Attachments:

1. Preliminary Final EA
2. Draft Conformity Analysis (inbound)

1st Ind,

TO: 30 SW/ET

We recommend approval of the environmental assessment for the Launch Rate Increase for Delta II Program at Vandenberg Air Force Base to the EPC.

\_\_\_\_\_  
Signature

DISTRIBUTION:

30 SW/ET/SES

2 SLS/DOOB

30 CES/CECB/CEVPN/CEVCR/CEVCC/CEVPC/CEVPP (3)

DET 9, SMC/CEW

22 RANS/CC/DOUN

DIANS

HIGH

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# ENVIRONMENTAL REVIEW SHEET

PROJECT # PROJECT TITLE PRELIMINARY FINAL EA, LAUNCH RATE INCREASE FOR DELTA II FROM SLC-2W  
SUGGESTED REVIEWERS ORGANIZATION

## ORGANIZATION COMMENTS/SUGGESTIONS/RECOMMENDATIONS

APPROVED DISAPPROVED

## Responses to Public Review Comments

1-1

CEVPN - Table 3-5: delete references to FC2 and FC3 from key, change "FC1" to "FC", and change "FC" to "FE". Shagbark manzanita and beach spectacle pod should be SSC, not FC, and seaside bird's beak is no longer FC (per C. Gillespie). Also, FPE can be deleted from Table 3-5 since it is not used.

1-1

Table 3-5 Text modified as suggested.

1-2

Table 3-6: *Neotoma* is misspelled, and should be noted as SSC, not SCC. Mountain plover is FC, not SSC (add FC to key). Recommend deleting California tiger salamander (also FC, not SSC), since intensive surveys in 1995 found none on VAFB. Under silvery legless lizard, California is misspelled.

1-2

Table 3-6 Text modified as suggested.

1-3

Page 3-19, 2nd paragraph: least terns have not nested at the mouth of San Antonio Creek for several years (see comments on preliminary draft EA). 4th paragraph: Jamison, not Jamison.

1-3

Page 3-19 Text modified as suggested.

1-4

Figure 3-6, p 3-26: data for 1993 are incorrect. Per USFWS request (pers comm B. Gorham, ENSR Apr 96), recent least tern and snowy plover data is attached for reference in the next version of the EA.

1-4

Figure 3-6 Figure has been updated.

1-5

Page 3-27: correct to reflect recent changes in candidate species listings per the Feb 96 Federal Register (only one wildlife species of concern to this project, the mountain plover, is a candidate on this latest list; others are SSC only - see comments on previous draft EA).

1-5

Page 3-27 Text corrected as suggested.

1-6

Section 4.3.3, page 4-17: comments on this section provided for the previous draft were not addressed.

1-6

Section 4.3.3 The text has been modified to reference impacts to humans. Potential cumulative impacts to biota are addressed in Section 4.4 and are referenced as such.

1-7

Section 4.4.3.3: previous comments regarding brown pelicans have not been addressed. We expect, based upon monitoring conducted for an LLV launch in August 1995 (Pollard 1996), that Delta II launches cause only a temporary startle response by pelicans, and would not result in significant impacts to this species. Nevertheless, the brown pelican is an endangered species which is known to frequent the Purisima Point area in high numbers (see comments to previous draft EA), and must be addressed if the EA is to be deemed adequate.

1-7

Section 4.4.3.3 Text has been inserted into Section 4.4.3.3 to consider potential impacts to pelicans.

1-8

Section 4.4.3.4, Mitigation Measures: Not all previous comments were addressed. Recommendations: 1st paragraph: delete "three". Because the studies identified by bullets on page 4-23 are either incomplete or have already been accomplished, recommend replacing these bullets with a single statement, with suggested wording: "Pinnipeds and threatened/endangered species will be monitored for launch impacts, following protocols identified in consultation with NMFS and USFWS. In addition, ongoing management efforts by VAFB focus on protection of least terns, snowy plovers, and pinnipeds in the Purisima Point using a variety of measures, including but not limited to: establishment of buffer zones to avoid disturbance from aircraft overflights and other disturbance; selective predator control; and regular monitoring to evaluate population status and reproductive success."

1-8

Section 4.4.3.4 The section on mitigation measures has been modified to address this comment as well as related ones. Text suggested by the reviewer has been incorporated.

1-9

Beginning with the last paragraph of page 4-23, recommend deleting the rest of the text in this section. This is recommended because the USFWS and NMFS programmatic consultations presently underway

1-9

Page 4-33 Text has been modified to incorporate the suggestions.

# Responses to Public Review Comments

	will identify specific requirements applicable to this project (as discussed p. 4-22-23), which may or may		
	not be the same as those listed here. If mitigation/monitoring commitments are identified in the EA, the		
	USAF bound under NEPA to comply with them even if they are not required under MMPA or ESA.		
	For the same reasons cited above, wording in Section 1.5, p 1-7 also should be changed. Also, on page		
	1-7, Section 1.4, delete the last paragraph (implies non-compliance with ESA!!!). In the 2nd paragraph		
	of this section, recommend adding "including this project" to clarify that the Delta program as proposed		
	in this EA is included in the programmatic consultations with NMFS and USFWS.		
1-10	Section 5.0: two misspellings noted in document.		
1-11	Appendix A: p A-1 last line: change "USPWS" to "USFWS" (this comment also made on previous draft).		
1-12	Because of the number of changes still to be made, recommend either: production of another prelimin-		
	ary final for review; or, if other sections are deemed adequate, provide review copy of pertinent sections		
	only for CEVFN review/approval prior to issuing the final EA.		
	NR 26 Apr 96 <i>AN</i>		

1-10	Section 5.0	Misspellings were corrected.
1-11	Appendix A	"USPWS" has been corrected.
1-12	General Comment	Comment noted and suggestions incorporated.

**CALIFORNIA LEAST TERN/WESTERN SNOWY PLOVER  
BREEDING POPULATION DATA 1993-1995**

<u>Species</u>	<u>Site/Beach Sector</u>	<u>Year</u>	<u># Pairs</u>	<u>Reference</u>
California least tern	Purisima Point	1993	9	The Nature Conservancy 1993
	Beach 2		10	
California least tern	Purisima Point	1994	38	Caffrey 1994
	Beach 2		1	
California least tern	Purisima Point	1995	38	Fahy and Schultz 1995
	Beach 2		1	
			<u># Birds</u>	
western snowy plover	North Beach	1993	115	Persons 1994
	South Beach		78	
western snowy plover	North Beach	1994	142	Persons 1995a
	South Beach		75	
western snowy plover	North Beach	1995	139	Persons 1995b
	South Beach		63	

Snowy plover nest data for Purisima to San Antonio Creek:

<u>Year</u>	<u>Site</u>	<u>Total # Nests</u>	<u>Citation</u>
1993	San Antonio	11	Persons 1994
	Purisima North	3	
	Purisima Colony	3	
1994	San Antonio	49	Persons 1995a
	Purisima North	7	
	Purisima Colony	11	
1995	San Antonio	43	Persons 1995b
	Purisima North	4	
	Purisima Colony	15	

**Notes:**

Snowy plover nest data for 1993 cannot be compared to 1994 and 1995 data, as monitoring did not begin until 16 June in 1993 and began 1 March in 1994 and 1995.

Beach sectors: Purisima Colony: within least tern electric fence. Purisima North: pocket beaches along generally rocky shoreline north of Purisima Point. San Antonio: sandy beach between Purisima North and San Antonio Creek.



Snowy plover population data: based on late June censuses and reported for general (north and south) beach segments only. "North" is Purisima colony north, to and including Minuteman Beach; "South" is Ocean Beach (including Surf and Wall).

#### Snowy Plover Winter Data, 1993-1996

<u>Beach Sector</u>	<u>Year</u>	<u>Maximum # Birds</u>	<u>Reference</u>
North Beach	1993-94	177	Read and Phillips 1994 in Persons 1995c
South Beach		128	
<u>Jalama Beach</u>		<u>106</u>	
Total		411	
North Beach	1994-95	292	Persons 1995c
South Beach		158	
<u>Jalama Beach</u>		<u>36</u>	
Total		486	
North Beach	1995-96	207	Persons 1996
South Beach		123	
<u>Jalama Beach</u>		<u>38</u>	
Total		368	

#### Reference Citations:

Caffrey, C. 1995. *California Least Tern Breeding Survey, 1994 Season*. Final Report to California Department of Fish and Game. Bird and Mammal Conservation Program Report 95-3.

Fahy, K. and S. Schultz. 1996. *California Least Tern 1995 Breeding Survey Report, Vandenberg Air Force Base*. Prepared for 30 CES/CEVPN, Vandenberg Air Force Base, California. Report from Santa Barbara Museum of Natural History.

Persons, P. 1994. *Western Snowy Plover Monitoring in 1993 at Vandenberg Air Force Base, California*. Prepared for U.S. Fish and Wildlife Service, Ventura, CA.

Persons, P. 1995a. *Western Snowy Plover Population Size and Reproductive Success in 1994 at Vandenberg Air Force Base, California*. Prepared for U.S. Fish and Wildlife Service, Ventura, CA.

Persons, P. 1995b. *Western Snowy Plover Population Size and Reproductive Success in 1995 at Vandenberg Air Force Base, California*. Prepared for Point Reyes Bird Observatory, Stinson Beach, CA.

Persons, P. 1995c. *Winter 1994-95 Censuses of Western Snowy Plovers, Vandenberg Air Force Base, California*. Report to U.S. Fish and Wildlife Service.

Persons, P. 1996. *Winter 1995-96 Snowy Plover Surveys, Vandenberg Air Force Base, California*. Unpublished Data.

The Nature Conservancy. 1993. *1993 Breeding Success for the California Least Tern on Vandenberg Air Force Base, California*. Prepared for 730 CES/CEVN, Vandenberg Air Force Base, California.



DEPARTMENT OF THE AIR FORCE  
30TH SPACE WING (AFSPACECOM)

4 APR 1996

2

MEMORANDUM FOR ENVIRONMENTAL IMPACT ANALYSIS PROCESS SUBCOMMITTEE

FROM: 30 CES/CEVPP

SUBJECT: Environmental Assessment (EA), for Launch Rate Increase for Delta II Program at Vandenberg Air Force Base (VAFB), California

1. Attached for your review and comment is the subject EA (preliminary final) dated March 1996, which proposes an increase in the launch rate from two to ten launches annually (maximum), at SLC-2W beginning in 1996.
2. Please ensure that your comments have been adequately addressed in the current document. If you concur with the document as proposed, please provide your recommendation for approval to the base Environmental Protection Committee (EPC) in the endorsement below and return your response NLT 7 May 1996. Should you have any questions, please contact Mr Garry E. Sanchez at (805) 734-8232, extension 6-2814.

F-7

*Garry E. Sanchez*  
GARRY E. SANCHEZ, GS-12  
Program Planning  
Environmental Management

Attachments:

1. Preliminary Final EA
2. Draft Conformity Analysis (inbound)

1st Ind,

TO: 30 SW/ET

We recommend approval of the environmental assessment for the Launch Rate Increase for Delta II Program at Vandenberg Air Force Base to the EPC.

\_\_\_\_\_  
Signature

DISTRIBUTION:

30 SW/ET/SES  
2 SLS/DOOB  
30 CES/CECB/CEVPN/CEVCR/CEVCC/CEVPC/CEVPP (3)  
DET 9, SMC/CEW  
30 RANS/CC, DOUN

Ann Basilwich  
CEVCR

4/10

## Responses to Public Review Comments

### Section 3.5.3, Page 3-28

2-1 ① Incorrect reference to document. Correct reference to Installation Restoration Program document is

"Draft Phase I Site Characterization Summary Informal Technical Information Report". This doc has not been published yet. Should be out by Summer '96

2-2 ② Section should discuss depth to GW in the area (which is as shallow as 7').

2-3 ③ What's the plan if GW is hit? What will it be analyzed for, and how will it be disposed of if contaminated?

2-4 Sections 4.2.1.1, 4.4.1.1 do not identify how deep construction will be; only lateral extent. 3-D picture is important.

FB

2-1

1) Text was modified and reference was corrected in Section 6.0.

2-2

2) Depth to ground water was discussed on page 3-29 with the accompanying table 3-7.

2-3

3) The response to hitting ground water was discussed in Section 4.5, page 4-25. Text has been supplemented for final EA

2-4

Sections 4.2.1.1, 4.4.1.1 Construction was described in Section 2.3.2. Text has been supplemented to address comment.



DEPARTMENT OF THE AIR FORCE  
30TH SPACE WING (AFSPACECOM)

3

Responses to Public Review Comments

MEMORANDUM FOR 30 CES/CEVPP  
ATTENTION: GARRY SANCHEZ

FROM: 30 CES/CEVPC

SUBJECT: Review of Preliminary Final Environmental Assessment for Launch Rate Increase for the  
Delta II Program at Vandenberg Air Force Base (VAFB), California

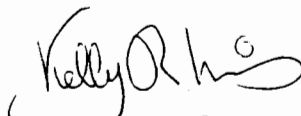
- 3-1 1. Thank you for allowing us the opportunity to comment on the above mentioned document. As I indicated in my comments for the draft Environmental Assessment, the depositional nature of the dune sands in the area of SLC-2 dictates that all ground disturbing activities associated with this undertaking will require monitoring by qualified archaeologists and Native Americans. Please change section 4.9 to reflect this requirement.
- 3-2 2. CEVPC will prepare a Scope of Work for monitoring activities when directed to do so. The cost of this work is identified by the National Historic Preservation Act (NHPA) as a project cost, and is the responsibility of the proponent.
- 3-3 3. If you have any questions please contact Kelly Minas at extension 6-0391, or Larry Spanne at extension 5-0748.

3-1 Text was changed to reflect reviewers concern.

3-2 Text has been modified to reflect the information presented in the comment.

3-3 Comment noted.

F-9

  
KELLY R. MINAS  
Staff Archaeologist

cc: 30 CES/CEV/CEVP/CEVPC

## 30 CES/CEVCC Attachment

4

### Responses to Public Review Comments

#### HAZARDOUS WASTE STATEMENT:

4-1 ANY HAZARDOUS WASTE GENERATED ON VANDENBERG AIR FORCE BASE BY A CONTRACTOR SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL RULES AND REGULATIONS. THE PRIMARY OPTION IS FOR THE HAZARDOUS WASTE TO BE PROCESSED THROUGH THE DEFENSE REUTILIZATION MARKETING OFFICE (DRMO) FOR DISPOSAL. IF DRMO CANNOT SUPPORT THE HAZARDOUS WASTE DISPOSAL AND DOCUMENTS IT IN WRITING, THEN THE HAZARDOUS WASTE CAN BE PROCESSED FOR DISPOSAL BY THE CONTRACTOR THROUGH 30 CES/CEVCC (ENVIRONMENTAL COMPLIANCE OFFICE). POINT OF CONTACTS ARE MR. BENNY ROMERO AT EXT. 5-0544 OR MR. WILLIAM DELGADILLO AT EXT. 6-5725.

4-1

Section 4.5 modified to include information from comment.

5

**Responses to Public Review Comments**

**Draft Environmental Assessment for Launch Rate Increase of Delta II**  
**EA Review Comments from 30 CES/CECB, phone # 6-4115, 6 May 96**  
**Section 2.3.2, Facilities Modifications, pp. 2-13 thru 2-16, including figure 2-7**

- |     |  |     |     |   |
|-----|--|-----|-----|---|
| 5-1 | 1. It is a concern of this office that our 14 Mar 96 comments were not addressed in this draft of the assessment. 30 CES/CECB is responsible for siting approval to the Vandenberg Facilities Board for all construction on base. Construction cannot be started until the siting process has been completed (Refer to 30 SWI 32-108).   | 5-1 | (1) | For all 14 March 1996 comments, either the text of the document was changed or an answer to the concern was provided. In all cases a written explanation of how the concern was handled was included in a letter from McDonnell Douglas to 30CES/CEVC VAFB dated 27 March 1996 (A31-L480-JRN-ML 96 46).   |
| 5-2 | 2. It is this offices understanding that to address safety concerns at the T-3 day point, a secondary egress route is being required by base safety to allow SLC-2 technical personnel to exit the site away from the launch vehicle direction. It appears in the assessment that the justification for a new paved asphalt entrance route to the site, 20'x 1,800' in length, including a new guard shack, is a VAFB safety office requirement. Is this the case? Please verify and provide comment in the assessment and to this office. Base Safety office is required to concur with any new egress configuration. Has a new evacuation plan, along with a new egress route, been submitted to 30 SW/SES for configuration approval? Please outline in the assessment the environmental and cultural constraints in the area of this new route.  | 5-2 | (2) | Section 1.3 of the EA has been modified to explain how the project addressed safety concerns. Specific concerns for cultural resources are also addressed in the Cultural Resources Inventory, a copy of which document is available through Mr. Jim Johnston at (805) 734-8232 extension 5 0633. Once the final design for the road has been completed, MDA will submit a revised evacuation plan showing the new egress route.  |
| 5-3 | 3. What is the justification for a new 120 car parking lot? Provide one in the assessment. How was the proposed location of the new lot formulated? Can it go anywhere else at the site (i.e. broken into smaller lots)? How were the 120 parking spaces in the new asphalt parking lot calculated? Is this requirement based upon the 14,000 sf of modular building being planned? Please outline in the EA the environmental and cultural constraints in the area of the proposed lot and other sites considered and their environmental constraints..   | 5-3 | (3) | Section 1.3 of the EA has been modified to explain how the project determined a 120 car parking area was required. The lot could be broken into smaller lots, however, such an arrangement would require the construction of additional access roads with additional impacts. The size of the parking lot and the number of spaces was not based on a specific mathematical formula, but rather on the maximum number of people anticipated as working and visiting at the site. The concerns for impacts to all environmental diciplines are covered in the Environmental Assessment. Specific concerns for cultural resources are also addressed in the Cultural Resources Inventory, a copy of which document is available through Mr. Jim Johnston at (805) 734-8232 extension 5-0633. Discussion of potential options for lot placement was not carried through the EA because impacts from all options were assumed to be equivalent and minimal. |
| 5-4 | 4. With the potential addition of approximately 100,000 asphalt roadway being proposed at the site, what will be the impacts of additional work (i.e. soil compaction, bulldozing, clearing the dune area for the route, and final paving). Also, what impacts such as soil erosion and stormwater runoff from the asphalt will occur in the areas adjacent to the new asphalt roadway and lot. Specify in the EA.   | 5-4 | (4) | Impacts for the additional work for the construction of the roadway and parking lot were identified in the EA in each issue area. The text was modified to address the specific concerns for soil erosion.  |
| 5-5 | 5. The second paragraph of section 2.3.2 is misleading. It gives the appearance that the facilities you are proposing adjacent to building 1628 are in concert with the USAF plan to eliminate trailers. The relocatables proposed are not consistent with USAF planning objectives. Modular and pre-engineered structures are considered temporary buildings. Change this paragraph to reflect that you are proposing modular facilities.   | 5-5 | (5) | The second paragraph in Section 2.3.2 has been modified to address the comments raised by the reviewer.   |
| 5-6 | 6. The EA addresses a plan to place approximately 14,000 sf of modular buildings at SLC-2. Per HQ Secretary of the Air Force/MII direction, the use of modular buildings is discouraged on military properties. Modular buildings are considered temporary structures. Approval of modular buildings for a temporary nature is allowed per HQ SAF/MII approval. This is a lengthy process and should not be considered a sure thing. Temporary approval of modular buildings is possible per the planned replacement of the modulars with permanent structures, which are to be constructed and complete within the 3 year temporary approval period. At the present time, extensions to this temporary approval are not being given. Is it the plan of SLC-2 to replace the 14,000 sf of modular facilities with permanent structures during this 3 year period? If not, this fact needs to be acknowledged clearly in the EA. Impact at undisturbed sites as opposed to using already disturbed sites is a planning consideration for all new development at VAFB. With the myriad of previously disturbed areas existing in the VAFB Cantonment area, much of the new required space (particularly administration and other supporting functions) should be considered to go at one of these locations rather than disturbing dune habitat at SLC-2 site. Any new facility will need to meet VAFB Facility Excellence standards. Even though a request has been forwarded to HQ USAF/MII, environmental impacts to the site will still need to be addressed prior to any presentation to the Vandenberg Facilities Board for siting approval. | 5-6 | (6) | The second paragraph in Section 2.3.2 has been modified to address the comments raised by the reviewer.   |



DEPARTMENT OF THE AIR FORCE  
30TH SPACE WING (AFSPC)

6

Responses to Public Review Comments

7 May 1996

MEMORANDUM FOR 30 CES/CEVPP

FROM: 30 RANS/DOUN

SUBJECT: Environmental Assessment (EA) for Launch Rate Increase for Delta II  
Program at VAFB.

E-12

1. I have reviewed the EA and have the following comments:

a. Please delete all reference to the California Native Plant Society (CNPS) within this document. This is not a Government organization and should not be recognized as such. By Vandenberg AFB recognizing this private organization, we are setting a poor precedence in having them determine federal or state policy as to what plants are a threatened or endangered species.

6-1b b. If the intent of this document is having the CNPS as a source as to the type of species found at Vandenberg AFB which may impact the EA, then this should be placed as a narrative at the beginning of the document. Only plants recognized as Federal or State threatened or endangered should be shown in the appropriate tables in the document. In order to address the CNPS special interest items, an appendix could be added to the document. This would show a thorough search of all plants present at Vandenberg AFB was conducted.

6-2 2. If you have any questions, I can be reached at 6-3602.

WALTER SCHOBEL  
Chief, Airspace and Offshore Management Section

6-1a

1(a) and Consistent with other EAs and based on coordination with the VAFB botanist, the information is appropriate. Text was not changed.

6-1b

(b) Consistent with other EAs and based on coordination with the VAFB botanist, the information is appropriate. Text was not changed.

6-2

2 Comment noted.



U.S. Department  
of Transportation  
  
Federal Aviation  
Administration  
Office of Commercial  
Space Transportation

400 7th Street, S.W., Room 5415  
Washington, D.C. 20590

MAY 31 1996

Mr. Garry E. Sanchez  
Program Planning  
Environmental Management  
30 CRS/CEV  
806 13th Street, Suite 116  
Vandenberg Air Force CA 93437-5242

Dear Mr. Sanchez,

This letter is in response to your memorandum, dated April 14, 1996, regarding McDonnell Douglas Aerospace's "Environmental Assessment for Launch Rate Increase for Delta II Program at Vandenberg Air Force." The attached document contains the comments of the Office of the Associate Administrator for Commercial Space Transportation (OCST) for the Environmental Assessment. An advanced copy of these comments was sent to you via fax on May 10, 1996.

We request that a copy of the final Environmental Assessment be provided to OCST.

If there are any questions regarding the attached comments, please contact Mr. Nikos Himaras of my staff at (202) 366-2455.

Sincerely,

Ronald K. Gress, Acting Manager  
Licensing and Safety Division

Enclosure

Comment noted.

F-13



## Responses to Public Review Comments

E-14

### OCST COMMENTS

#### MCDONNELL DOUGLAS AEROSPACE ENVIRONMENTAL ASSESSMENT FOR LAUNCH RATE INCREASE FOR DELTA II PROGRAM AT VAFB

7-1	The recommendations (in bold font) involve highly advisable actions. The remaining, while advisable, are not essential for technical sufficiency.	7-1	#1	Comment noted.
7-2	<b>Provide a consolidated list of all abbreviations and acronyms</b> which are used in the document. For example, newly introduced terms in figure 2-4, such as SECO and MECO, could be defined in preceding text or clarified in a consolidated list which spells out all abbreviations and acronyms. Other examples include SRMU, LLV, and CCAS.	7-2	#2	Text included as suggested.
7-3	<b>Provide a list of the addresses to which the analysis is being distributed.</b> Ref OCST-RD-ENV01-95, page 16, section 3.10, paragraph 2.	7-3	#3	Included in Section 6.0
7-4	Recommend units of measure be presented in metric form throughout the document with the English equivalent following in parentheses(e.g. page 2-1, 1st and 2nd paragraphs).	7-4	#4	Metric measurements have been added throughout the document
7-5	<b>Recommend a "source" be identified for data presented in tables.</b>	7-5	#5	Sources identified for all tables.
7-6	Pg 1-1, section 1.1, last line. Recommend adding, "This document also satisfies guidelines applicable to environmental review of the Department of Transportation for commercial space launch sites, OCST-RD-ENV01-95, May 1995."	7-6	#6	Text added.
7-7	Pg 1-6, lines 7-14. Recommend citing of the source of the quote.	7-7	#7	Source added to text.
7-8	Pg 1-7, section 1.4. Recommend updated correspondence relating to consultation with appropriate federal and state agencies, particularly concerning special-status species, be added as an appendix.	7-8	#8	Text has been modified. Applicable correspondence with the agencies is included as an appendix. To date, no written correspondence has been received from the USFWS.
7-9	Pg 2-2, section 2.3, 2nd paragraph, line 3. Insert, "See section 1.5" after, "...with only minor considerations on the timing of the launches." This will refer readers to the section which describes the kind, and reason, for timing considerations.	7-9	#9	Suggested text included. Reference to Section 1.5 was amended to be to Section 1.2 consistent with the location of the information referred to in the comment.
7-10	Pg 2-6, 2nd and 4th paragraphs. Recommend the chemical character of the following items be identified to enhance the readers' understanding: propellant in the graphite epoxy motors (see 2nd paragraph, line 4) and Aerozine-50 (see 4th paragraph, line 1).	7-10	#10	Text annotated with footnotes for each propellant.
7-11	Pg 2-7, section 2.3.1.2, 3rd paragraph, last line. Recommend the following be added, "See ref page 4-10 and Appendix D." This serves as a timely clue to readers regarding data available elsewhere relative to the character of waste water.	7-11	#11	Suggested text included.
7-12	Pg 2-13, section 2.3.1.4, line 10. Recommend insertion to read as, "...in its largest	7-12	#12	Suggested text included.

## Responses to Public Review Comments

configuration (LLV-3) is comparable in size but to slightly smaller than the Delta II." This change allows the text's description to remain consistent with varying interpretations of a graphic presentation; figure 2-6 suggests the Delta has more SRMs and would be heavier than the LLV.

7-13	Pg 2-16, Table 2-3. <b>Recommend the addition of a footnote which defines the "Rating Factor" or provide an explanation which makes the factor's significance more evident.</b>	7-13	#13	Table modified for clarity and footnote added as suggested.
7-14	Pg 2-17, section 2.4, 1st full paragraph, line 3. <b>Recommend deletion of "or modified".</b>	7-14	#14	Text was modified otherwise in response to another comment.
7-15	Pg 3-2, section 3.1.2, 2nd paragraph, next to last sentence. <b>Insert, "or equal to" after "less than."</b>	7-15	#15	Text modified as suggested.
7-16	Pg 3-5, section 3.1.4. Note: If the 8 additional launches are accompanied by increased use of rocket test stands, then the status of permitting for this collateral activity should also be mentioned.	7-16	#16	Additional test stand use will not occur.
7-17	Pgs 3-13, 3-17, and 3-23. <b>Recommend a source citation be added to tables 3-4, 3-5, and 3-6. This will demonstrate the currency of information obtained from expert sources. Ref 40 CFR 1500.1(b) "information must be of high quality. Accurate scientific analysis, and expert agency comments, ... are essential."</b>	7-17	#17	Text modified as suggested.
7-18	Pg 3-17, Table 3-5. <b>Recommend explanation of "4".</b> The status column lists "4" which is not explained in the footnotes as done for the other codes.	7-18	#18	Text modified as suggested.
7-19	Pg 3-26, Figure 3-6. <b>Recommend addition of data points for 1994 and 1995, if available, since the text indicates the population will be described beyond 1993.</b> Note, Figure 3-6 shows data through 1993; this conflicts with the statement at Appendix A-4, last paragraph, which states, "Data from 1978 through 1995 ... are shown in Figure 3-6."	7-19	#19	Figure was updated and modified as suggested. Reviewer should note that Figure 3-6 did contain data from 1994 and 1995 under the appropriate tick marks on the graph.
7-20	Pg 3-27, section 3.5.1. <b>Recommend mentioning that hypergolic fuels are used in the second stage and represent a hazard.</b>	7-20	#20	Short section on fuels as hazardous substances has been included as Section 3.5.2.
7-21	Pg 4-2, section 4.1.2.1, 2nd paragraph, lines 2-3. <b>Recommend inclusion of supporting reference or rationale for the notion that emissions between 3,000 feet and 15 km are not considered to have any impact.</b> Ref 40 CFR 1500.1(b) ("...information must be of high quality. Accurate scientific analysis, and expert agency comments, and ... are essential.")	7-21	#21	Comment noted.
7-22	Pg 4-4, 1st paragraph, line 2. <b>Recommend identifying the distance to the nearest VAFB property line.</b>	7-22	#22	Additional discussion and supporting references have been added to this paragraph.

## Responses to Public Review Comments

7-23	Pg 4-4, 1st paragraph, lines 4-5. Recommend a reference citation for the given NRC exposure limit; include the cited source in Section 6, References.	7-23	#23	The distance to the nearest VAFB property line has been added.
7-24	Pg 4-4, 2nd paragraph, line 3. Recommend addition of the reference, "ES&E, 1988" to Section 6, References.	7-24	#24	The reference has been changed to the document from which the information was taken.
7-25	Pg 4-7, Table 4-5. Note: The column labeled "Total Annual Emissions" reflects the increase in total annual emissions. Recommend the cumulative total emissions from launches, support facilities, and control equipment be depicted in addition to the total change in annual emissions from the 8 additional Delta launches. This could better demonstrate that cumulative effects were considered.	7-25	#25	The reference has been changed to the document from which the information was taken.
7-26	Pg 4-9, 1st paragraph, last sentence. Recommend revision to read, "...would not significantly affect the quantity of water available..."	7-26	#26	An additional table was added to Section 4.1.6, Cumulative Impacts, to show the emissions of a total of ten launches per year.
7-27	Pg 4-10, 3rd paragraph, lines 5-6. <b>The statement that IPS water "will likely be classified" as an industrial waste water suggests a decision is pending. If the IPS waste is not yet classified as industrial water, then we recommend either providing an estimated date for the anticipated decision or describing the essence of ongoing consultation to resolve the issue.</b>	7-27	#27	Text was modified to clarify the assumptions used to conclude that there would be no significant impacts from the disposal of the IPS water. In particular, historically the IPS water has been characterized as industrial wastewater, and it is assumed that it will again be characterized as such. No ongoing consultation is occurring relative to IPS water.
7-28	Pg 4-11, lines 1 and 2. Recommend identification of the fate and significance of contaminant concentrations on the ground in the area of the pad. Explain whether exhaust products (HCl, aluminum compounds) would become concentrated in the soil.	7-28	#28	Text was modified to address comment.
7-29	Pg 4-11, Accidental Releases. Recommend mention of the increased chance for accidents (fuel spills, fires, explosions, etc.) and their subsequent impacts. If available, provide a quantified estimate for the increased potential for releases due to accidents. If the accidental destruction and release of payload materials will be addressed in subsequent analysis, so state. If it is known that all accidentally dispersed payloads will have negligible impact, then we recommend the payloads be described in this analysis to reduce requirements for future assessment.	7-29	#29	A quantitative assessment was not done to assess the potential for spills or other accidental releases. Due to the high reliability of Delta II and the positive control during flight by the VAFB Range Safety Office, increasing the number of launches is not expected to increase the potential for accidental releases to a significant level. Although payload impacts are expected to be negligible, an environmental impact analysis is done for every payload.
7-30	Pg 4-11, 3rd paragraph, line 4. <b>Recommend rewording to read, "...so it can be tested for proper disposal."</b>	7-30	#30	Text modified as suggested.
7-31	Pg 4-12, section 4.2.3, Cumulative Impacts. The impact of increased water usage in conjunction with water usage from other activities on the installation could be mentioned under Cumulative Impacts even though the project contributes a relatively small increase. 40 CFR 1508.27(b)(7).	7-31	#31	Text modified in response to suggestion.
7-32	Pg 4-15, section 4.3.2.4, 1st bullet, next to last sentence. <b>Recommend the azimuth be changed to correspond with figure 2-5 on pg 2-12.</b> For example, "...missions track roughly a 196 degree azimuth."	7-32	#32	Text modified as suggested.

## Responses to Public Review Comments

- |      |  |      |     |  |
|------|--|------|-----|--|
| 7-33 | Pg 4-17, section 4.3.2.5, 2nd paragraph, 2nd sentence. <b>Recommend insertion to read as, "... can be attributed, but not limited, to..."</b> Other possibilities can explain a lack of complaints. For example, the absence of complaints could also result from either the lack or ignorance of an established system to receive and record complaints.  | 7-33 | #33 | Text included as suggested.  |
| 7-34 | Pg 4-20, section 4.4.3, 2nd paragraph. Recommend a reference citation be given for the assertions regarding noise; include the cited source in Section 6, References.  | 7-34 | #34 | Text modified for clarity and reference included as suggested.   |
| 7-35 | Pg 4-23, last bullet. Recommend the responsible biologists' organization(s) also be identified.  | 7-35 | #35 | Monitoring requirements have been modified in response to other comments, but intent of comment has been incorporated into new requirements. |
| 7-36 | Pg 4-24, section 4.4.4, Cumulative Impacts, 1st sentence. <b>Recommend rewording to avoid what appears as a contradiction</b> with page 4-26, section 4.7, last sentence. The first reference states, "The launches at SLC-2 and other facilities are ... not typically coordinated." But, the latter reference states, "...launch scheduling is coordinated throughout VAFB, other launches will be coordinated ... to ensure that no cumulative impacts ..." | 7-36 | #36 | Text was modified to explain the level of coordination that occurs for launch activities.  |
| 7-37 | Pg 5-1, section 5.0. Recommend the contributor's years of experience be given to demonstrate experience levels along with the contributors' interdisciplinary character. Ref 40 CFR 1502.6 and 1502.17 which specifically applies to an EIS but is also a good practice for other environmental analyses.  | 7-37 | #37 | Contributor's areas of responsibility and years of experience were included.   |
| 7-38 | Appendices B, C, D, and E. <b>Recommend page numbers be added.</b>   | 7-38 | #38 | Page numbers have been added as suggested.   |



8

## County of Santa Barbara Planning and Development

John Patton, Director

### Responses to Public Review Comments

15 April 1996

Garry E. Sanchez  
Program Planning, Environmental Management  
30 CES/CEV  
806 13th Street, Suite 116  
Vandenberg Air Force Base, California 93437-5242

RE: Draft Environmental Assessment for Delta II Program Launch Rate Increase

Dear Mr. Sanchez:

8-1

Thank you for the chance to comment on this draft environmental document. Santa Barbara County generally appreciates and supports the various space programs at Vandenberg Air Force Base, including the job opportunities and overall economic stimulus they provide to the County. However, it also is important that any potentially adverse effects of such programs be anticipated. In this spirit, we have noted in comments on prior environmental documents for other projects that the County's primary concerns over potentially adverse impacts are related to public health and safety, esp. fuels transportation and the direct and indirect effects of potential debris from launch mishaps. The latter encompasses concerns over potential closures of County-owned parks at Ocean Beach and Jalama, as well as closures and evacuations of other public use areas and private properties. The subject document should address such potential impacts, particularly the cumulative effects of this and other anticipated programs such as NASA's Earth Observing System Program, for which a draft Environmental Assessment recently has been released for public review and comment.

F-18

Again, thank you for the chance to comment. Please contact Greg Mohr at (805) 568-2080 if you should have any questions.

Sincerely,

DANIEL H. GIRA, Acting Deputy Director  
Comprehensive Planning Division

xc: Claude Garciacelay, County Park Dept.  
Jim Raives, CA Coastal Commission

gm--G:\GROUP\COMP\WP\CORRESP\LETTERS\DELTA2\EA.CMT

Ana rect  
Phone: (805) 568-2000

Barbar 9310  
Fax: (805) 568-2030

8-1

The EA has been modified to incorporate by reference the analysis and discussion of safety included in the EA for the California Spaceport (1995) since the analyses and conclusions would be equally applicable to the current document. Also, concern for closure of public beaches has been discussed in section 4.7. Finally, the impact of the present project has been considered when taken in conjunction with other projects anticipated for occurring from VAFB, among them being NASA's Earth Observing System Program.



Santa Barbara County  
Air Pollution Control District

Responses to Public Review Comments

April 22, 1996

Mr. Gary E. Sanchez, Program Planning  
Office of Environmental Management  
806 13th Street, Suite 116  
Vandenberg AFB, CA 93437-5242

RE: **Launch Rate Increase for Delta II Program:** Environmental Assessment, April, 1996.

Dear Mr. Sanchez:

The Santa Barbara County Air Pollution Control District (APCD) appreciates the opportunity to comment on the above mentioned document.

GENERAL COMMENTS

From the information in the EA, tropospheric air quality impacts of the project do not appear to be significant. However, we would like to correct the conformity analysis methodology used in the EA (see below).

Comment noted

SPECIFIC COMMENTS

F-19

- 9-1 Page 4-4, 4th paragraph, 1st sentence. The document states that according to the motor manufacturer none of the  $Al_2O_3$  would be  $PM_{10}$ . This is inconsistent with the draft CIR<sup>1</sup> for VAFB. Please ensure that the launch vehicle emission factors and  $PM_{10}$  fraction of  $Al_2O_3$  used in this document are consistent with the final CIR for VAFB.
- 9-2 Page 4-6, Section 4.1.4, 1st paragraph, last sentence. Please add that APCD Rule 702 does not include 40 CFR Section 51.860 of Subpart W in verbatim form.
- 9-3 Page 4-6, Section 4.1.4, 2nd paragraph and Page 4-7, Table 4-5. Please note that in terms of the NAAQS, Santa Barbara County is a moderate nonattainment area for ozone and is in attainment for all other pollutants. The County is also considered to be outside the ozone transport region. Therefore, the conformity analysis *de minimis* thresholds are 100 tons per year each for  $NO_x$  and ROG. In addition, if the emissions are below the *de minimis* thresholds, a determination that the project emissions are not regionally significant (40 CFR 51.853[i]) must be made by showing that they are less than 10 percent of the latest emission inventory (currently the 1996 inventory shown in the 1994 CAP).

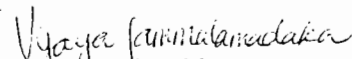
- #1 The manufacturer has provided additional information indicating that a majority of the particulate emissions from the solid rocket motors is less than or equal to 10 microns in diameter at the nozzle. While there is a feeling that many of the fine particles recombine to create particles larger than 10 microns, there is no hard data to support this contention. Therefore, as a conservative estimate, the  $PM_{10}$  emission numbers have been adjusted to include the expected  $PM_{10}$  fraction at the nozzle. The updated information from the manufacturer has been provided to the preparers of the CIR for consistency.
- #2 The referenced text in Section 4.1.4 (now Section 4.1.5) has been changed to clarify that Section 51.580 of Subpart W was not taken verbatim for APCD Rule 702.
- #3 The text of the referenced paragraph in Section 4.1.4 (now Section 4.1.5) and the associated table (renumbered to Table 4-6) have been modified to include only ROG and  $NO_x$  in the conformity determination and to reflect the correct *de minimis* emission levels for ROG and  $NO_x$ . Furthermore, it is also demonstrated in Table 4-6 that estimated project emissions of ROG and  $NO_x$  are less than 10 percent of the respective regional emission totals.

<sup>1</sup> CH2M Hill, March, 1996. *Draft Air Emissions Comprehensive Inventory Report for Vandenberg Air Force Base.*

- 9-4 Page 4-7, Section 4.1.5. To determine the significance of the cumulative impacts of a project, the project's emissions may be compared to the growth factors in the most recent air quality plan. (The 1994 Clean Air Plan included growth factors derived by the Santa Barbara County Association of Governments (SBCAG) from VAFB's Base Comprehensive Plan). In other words, if the proposed project is consistent with VAFB's Base Comprehensive Plan, then the project is also consistent with the Clean Air Plan (Brian Bresolin, SBCAG, pers. comm, 9/12/95) and long-term cumulative impacts may be deemed insignificant.

Again, thank you for the opportunity to review the EA for this important project. We look forward to receiving the final EA with responses to our comments. Please call me at (805) 961-8893 if you would like clarification on the above comments.

Sincerely,



Vijaya Jammalamadaka  
Air Quality Specialist

Technology and Environmental Assessment Division

cc: Project File (VAFB: Delta II Program)  
TEA Chron File

H:\GROUP\PCA\WPI\ARCORR\VAFB\DLTA.EA

## Responses to Public Review Comments

- 9-4 #4 Because Santa Barbara County did not violate the federal ozone standard in 1994, the Santa Barbara County Board of Supervisors approved an Air Quality Maintenance Plan as part of the Clean Air Plan on November 2, 1994. This plan included an allotment for growth in emissions at VAFB of 25 tons and 200 tons for VOC and NO<sub>x</sub>, respectively, relative to the baseline year of 1996. Since that time, violations of the federal ozone standard has been experienced in Santa Barbara County and the Maintenance Plan has been suspended. However, Board of Supervisors approval of the Maintenance Plan indicates their intent to allow growth at VAFB. The cumulative Delta II emissions of VOC and NO<sub>x</sub> are less than 1 ton per year and are therefore a small fraction of the growth allowance included in the Maintenance Plan. Therefore, the cumulative impacts of this project are not significant.



SPACEPORT  
SYSTEMS  
INTERNATIONAL

3769 Constellation Road  
Lompoc, CA 93436  
805.733.7370  
fax: 805.733.7372

9 May 1996

Garry Sanchez  
Environmental Planner  
30 SW/CEVPP  
806 13<sup>th</sup> Street, Suite J  
Vandenberg AFB, CA 93437-5320  
805-734-8232, 6-2814

Subject: Comments to the EA for Launch Rate Increase for Delta II Program at VAFB

Dear Garry:

- 10-1 Space Systems International appreciates the opportunity to comment on the Environmental Assessment (EA) for Launch Rate Increase for the Delta II Program at Vandenberg Air Force Base.
- 10-2 A major aspect of the environmental impact analysis process as codified by the National Environmental Policy Act (NEPA) is the identification of all practical alternatives to proposed federal actions to allow a determination as to which alternative poses the least negative impact to the environment. Our reading of the subject EA leaves us with the impression that practical alternatives to the proposed action have not been adequately addressed. Consequently, we do not agree that the proponent has substantiated the assertion that increased launch rates from SLC-2 would afford NASA, DOD and commercial customers with the *environmentally optimal* domestic capability to launch satellites into polar orbit.
- 10-3 As is well known to the proponents of this action, Space Systems International is well into the construction of the California Spaceport which will have the capacity for up to 24 polar launches per year from Vandenberg Air Force Base. This facility will be able to accommodate payloads commensurate in size with those manifested for the Delta II at competitive costs. Furthermore, SSI has undertaken a supplemental environmental analysis of proposed modifications to the original design of the California Spaceport that will enable it to accommodate launches of the Delta II. This analysis to date indicates that such an action would be well within the environmental baselines already approved for the California Spaceport—i.e., modification of the space launch facility (SLF) and up to 24 subsequent launches of the Delta II would be within the environmental impact baselines already established for this facility. We believe this emerging capability must be addressed completely if the Delta II EA is to conform with the requirements of NEPA.
- 10-1 Paragraph #1 Comment noted.
- 10-2 #2 As explained in subsequent responses, a full range of potential alternatives have been evaluated for feasibility in meeting the objectives of the current project. The EA did not address alternatives that might meet the requirements of a different project that might arise in the future. Comment noted.
- 10-3 #3 The current project proposes launching rockets at the increased rate beginning late 1996 and continuing in the near future. At the present time the capacity for meeting this schedule does not exist at the California Spaceport for launching the Delta II. Because such capacity does not exist the schedule for completing the project could not be met. Therefore, the California Spaceport does not offer a viable alternative to the proposed project.

F.21

Specific concerns with the Delta II EA as currently drafted are as follows:



## Responses to Public Review Comments

- 10-4 • Paragraph 1.0 Introduction. The proponent should qualify the claim that "at present the most cost effective and safest means of attaining polar or near polar orbit in the United States is to launch from Space Launch Complex 2 West (SLC-2W) on Vandenberg Air Force Base." This assertion should be justified by direct comparison and analysis of other operational launch facilities on the base as well as the California Spaceport which will achieve initial operational capability in 1997.
- 10-5 • Paragraph 1.3 Need for the Proposed Action. The EA implies that SLC-2 will provide *the* capability versus *additional* capability to launch up to 10 commercial, scientific, and government payloads annually without launching over populated land areas. The theme underscored throughout the EA that SLC-2W provides a unique capability for launching satellites safely into polar orbit is misleading, and a precise description of such existing and planned capability throughout the base should be provided to allow a proper assessment of the urgency associated with increasing the Delta II launch rate at SLC-2W to 10 per year.
- 10-6 • Paragraph 1.5 Identified Mitigation. The proponent should clarify the following points related to the mitigation measures proposed in this paragraph:
- Under what authority will MDA restrict flying altitudes in the vicinity of Purisima Point or restrict emergency fuel jettison points to two miles offshore? Have these restrictions in fact already been implemented by the Air Force?
  - For precisely what range of wind directions will launches be prohibited during the least tern/snowy plover nesting season?
  - Which public beaches will be impacted and for how often and for how long by the proposed increase in the Delta II launch rate at SLC-2W? Is the proponent able to quantify the maximum number of these launches that will occur over weekends?
- 10-7 • Paragraph 2.3 Proposed Action. The EA should identify how many of the proposed ten annual Delta II launches from SLC-2W may occur during the least tern nesting season. In addition, it should be clarified as to how many other launches in the vicinity of the least tern colony at Purisima Point may occur. Previously, it was implied in Paragraph 1.2 that up to four launches could occur during the least tern breeding season; was this total inclusive of the Delta II or did it include launches of Peacekeeper and Taurus vehicles? The EA should explicitly delineate *how many launches can occur during the least tern breeding season in the vicinity of Purisima Point* to allow a meaningful assessment of impacts to this endangered species.
- 10-8 • Paragraph 2.3.1.4 Comparison of Rockets at VAFB. Why is the Delta II being compared to the Space Shuttle which has never been launched from Vandenberg? Also, the Taurus is described as being "slightly smaller" than the Delta II, when in actuality the gross liftoff weight of the Taurus is 156,700 pounds versus 513,000 pounds for the Delta II—the Delta II is more than three times as large as the Taurus.
- 10-9 • Paragraph 2.4 Alternatives to Proposed Action. The assertion that all other alternatives would fail to meet mission payload or schedule requirements by "several years or more and at considerably more cost" is simply unsubstantiated, erroneous, and misleading. Clearly, a much more detailed analysis of the launch capacity afforded at the California Spaceport and other locations at Vandenberg is required for an adequate comparison of alternatives.
- 10-4 #4 Paragraph 1.0 Text is modified to clarify that at the present time, SLC-2W is the most cost-effective and safest location for launching Delta II rockets to achieve polar or near-polar orbits. This assertion indirectly acknowledges that there may be other locations that could become available in the future, however, at the current time, no other location could meet the objectives of the project.
- 10-5 #5 Paragraph 1.3 The EA was modified to indicate that the project will provide additional capability
- 10-6 #6 The mitigation measures were included simply to demonstrate the types of efforts that are being undertaken to protect the terns and plovers at Purisima Point. Because the inclusion of this information was apparently confusing to several readers, it has been removed. Also, based on the data collected to date and presented in the revised EA (Section 4.4.2), launches will not need to be restricted under any wind conditions suitable to other launch safety constraints. Finally, based on historic launches, at maximum launch rates, it is anticipated that beaches would be closed for fewer than 2 weekend days per year, within required mission constraints weekend daylight launches will be avoided, and if weekend daylight launches occur, the beaches would be closed for the shortest possible time given normal considerations for safety (Section 4.7)
- 10-7 #7 The EA (Section 4.4.3.3) identified how many of the proposed ten annual Delta launches from SLC-2W could occur during the least tern nesting season. Text has been modified to allow a meaningful assessment of impacts to terns and plovers. Based on a review of launches from SLC-2W and adjacent facilities since 1978, it appears that there is a relatively short critical period within the tern's nesting season during which they could be disrupted sufficiently to abandon Purisima Point as a nesting site for a given year. However, based on these same data, it does not appear that disruption of one year's nesting affects the subsequent year's nesting. In response to informal consultation with the USFWS and the California Coastal Commission, MDA will be collecting data for up to five launches occurring during the critical window for tern and plover nesting. After these launches have occurred and sufficient data are available to draw more definitive conclusions about potential impacts terns and/or plovers consultation with USFWS will be reinitiated. The additional requirements for data analysis have been incorporated into the revised EA.
- 10-8 #8 An extensive amount of analysis was prepared in anticipation of the Space Shuttle using VAFB as a launch site. These analyses have repeatedly been used in subsequent assessments. For example, on page 117 in the EA for the California Spaceport modeling data for sonic booms by the space shuttle were cited as a basis for eliminating concern for the effect of sonic booms on Channel Island pinnipeds. Use of these type of data are to allow the reader to put the environmental assessment into a fuller context of previous studies. The text comparing the Taurus to the Delta II has been modified.
- 10-9 #9 As discussed above, there are no alternative sites on VAFB with existing abilities for meeting the project objectives. Text has been modified to address specific concerns expressed by the reviewer relative to alternative launch sites not in current schedules for several years.

## Responses to Public Review Comments

- 10-10. Paragraph 2.4.2 Launch from a New Site or Existing Non-Delta Site. This EA virtually ignores the construction of the California Spaceport and the potential to modify it to accommodate the Delta II. This is a serious omission. The implication that the use of the California Spaceport would entail "significantly greater environmental impacts from construction, evacuation and heavy equipment" ignores the fact that construction activity is a *fait accompli* at the California Spaceport—i.e., construction of the spaceport has already been initiated and will be completed regardless of how operations at SLC-2W may be altered. Furthermore, the EA does not describe or substantiate the implication that evacuation requirements will be more severe for launches at the California Spaceport versus SLC-2W.
- 10-11. Paragraph 2.4.4 No Action. The assertion that the proposed action represents the "most cost effective" means to advance the President's program for assured access to space is proffered without any analysis, and SSI challenges the validity of this claim. This assertion is a crucial element of the justification of the proposed action, and it should be substantiated with an in depth comparison of alternative actions.
- 10-12. Paragraph 4.3.3 Cumulative Impacts. Certainly a discussion of this environmentally sensitive topic requires more than *two* sentences simply asserting that no impacts will occur. The potential impact to the least tern should be analyzed in the context of the maximum number of launches during the breeding season that may occur from both SLC-2W and other launch sites in the vicinity of Purisima Point.

Please contact me at 805-733-7370 with any questions concerning these comments.

F-23

Sincerely,



Lori Anne Redhair  
Environmental Chief

- 10-10 #10 As discussed above, there are no alternative existing capabilities for meeting the stated project objectives. The typographical error by which the word "evacuation" rather than "excavation" occurred in the document has been fixed. Clearly, the term "excavation" fits with the context of the statement while the term "evacuation" makes no sense.
- 10-11 #11 As discussed above, there are no alternative existing facilities capable of meeting the project objectives.
- 10-12 #12 Analysis of cumulative impacts were included in each subsection within Section 4.0. Potential cumulative impacts to biota were addressed in Section 4.4.4 as noted in Section 4.3.2.6. For impacts to humans, the addition of up to 10 launches annually is not expected to cause a significant impact to humans removed from the launch site.

cc:  
Col. Louis D. Van Mullem, Jr., 30 SW/ET  
Orlando J. Severo, Jr., SSI  
Tim Crean, SSI

## REVISED DRAFT

MEMORANDUM FOR ENSR CONSULTING AND ENGINEERING  
ATTN: MR BILL GORHAM  
1220 AVENIDA ACASO  
CAMARILLO, CALIFORNIA 93012

FROM: 30 CES/CEVP  
806 13th Street  
Building 7015, Suite 116  
Vandenberg AFB CA 93437-5242

SUBJECT: Preliminary Final Environmental Assessment (EA) for Launch Rate Increase for Delta II Program at Vandenberg Air Force Base (VAFB), California

11-1a 1. The subject draft EA, dated March 1996, has been reviewed by the public, regulatory agencies, and the Environmental Impact Analysis Process (EIAP) Subcommittee. We are forwarding the following additional comments.

a. Sec 2.3.2. pg 2-13. Facilities Modifications. General. Revise text to include rationale for proposed roadway alignments, parking lot siting (i.e. long term safety non-compliance, toxic hazard corridor).

11-1b b. Sec 2.3.2. pg 2-13. Facilities Modifications. General. Settlement conditions apply for all new construction and any demolition. Notification is required on all demolition work, and will be performed by contractor. For questions regarding asbestos, contact 30 CES/CEVCC (Capt Slaby, or Bob Campbell at 6-0126).

11-1c c. Sec 2.3.2. pg 2-13. Facilities Modifications. General. The EA identifies three new project elements: "two new roads", "new parking lot", and "up to four new buildings" for impact analysis. Environmental impacts associated with construction of these "facilities modifications", such as activities that produce noise, dust, air emissions, must be evaluated in the EA. Include in this discussion of environmental impacts, all alternative sitings or alignments considered and eliminated, and the relative impacts of those alternative sitings or alignments.

11-1d d. Sec 2.4. pg 2-17. Alternatives to Proposed Action. Revise language in this section to establish that alternatives 2.4.1, 2.4.2, 2.4.3 were among those alternatives initially considered but eliminated from detailed study. Include a short discussion that explains the reasons why these alternatives were withdrawn from further consideration (e.g. logistics, feasibility, cost, security,

11-1a #1a Text has been modified to address comments.

11-1b b Information on settlement conditions have been incorporated into the document.

11-1c c Section 2.3.2 has been expanded to include the rationale for selection of the options for siting of the buildings, road, and parking lot. Since all options resulted in negligible impacts, specific analyses for each option was not included in the rest of the document.

11-1d d Text in Section 2.3.2 was revised to address comment.

## Responses to Public Review Comments

safety, availability, etc). For example, non-availability for immediate use of the California Spaceport needs to be addressed under Sec 2.4.2.

- 11-1ee. Sec 2.4.4, pg 2-18, para 3. No Action. General. Pursuant to CEQ Regulations at 40 CFR 1502.14(a)(d), the relative impact of alternatives to the proposed action (including "no action") must be evaluated for comparison of the anticipated impacts of all *reasonable* alternatives. Although further analysis of alternatives 2.4.1, 2.4.2, 2.4.3 may be discontinued (if considered not reasonable), evaluation of the "no action" alternative must be sustained throughout the document (i.e. impacts with project v without project). The current draft EA discontinues any comparison of impacts of the proposed action v no action, after Sec 2.4.4. 11-1e
- 11-2 2. This concludes our comments. Original comments for this document were provided in our letter of 15 May 96. Should you have any questions, please contact Mr Garry E. Sanchez (805) 734-8232, extension 6-2814. 11-2

e Evaluation of the No Project alternative has been included in Section 4.0.

#2 Comment noted.

KARL E. KNEELING, P.E.  
Chief, Planning  
Environmental Management



DEPARTMENT OF THE AIR FORCE  
30TH SPACE WING (AFSPACECOM)

12  
12 FEB 1996

MEMORANDUM FOR ENVIRONMENTAL IMPACT ANALYSIS PROCESS SUBCOMMITTEE

FROM: 30 CES/CEVP

SUBJECT: Draft Environmental Assessment (EA), for Launch Rate Increase for Delta II Program at Vandenberg Air Force Base (VAFB), California.

1. Attached for your review and comment is the subject draft EA dated February 1996, which proposes an increase in the launch rate from two to ten launches annually (maximum), at SLC-2W beginning in 1996.
2. Prepared comments should identify what corrections are required in the EA. Please state section, page, paragraph, and line references, and submit your written comments NLT 13 March 96. Should you have any questions, please contact Mr Garry E. Sanchez at (805) 734-8232, extension 6-2814.

*G. E. Sanchez*

GARRY E. SANCHEZ, GS-12  
Program Planning  
Environmental Management

DISTRIBUTION:  
30 CES/CEV(8)/CEC/CERE  
30 SW/SE/XPR/PA  
30 RANS/CC  
SMC/CWV  
SMC/CEW

*Comments attached  
Capt Stoby*

Responses to Public Review Comments

31MAY

COMMENTS ON ENVIRONMENTAL ASSESSMENT  
LAUNCH RATE INCREASE FOR DELTA II

- 12-1 1. SECTION 2.3.2 MODIFICATIONS, SETTLEMENT CONDITIONS APPLY FOR ALL NEW  
CONSTRUCTION AND ANY DEMOLITION.
- 12-2 2. NOTIFICATIONS IS REQUIRED ON ALL DEMOLITION WORK.
- 12-3 3. ANY QUESTIONS REGARDING ASBESTOS MAY BE FORWARDED TO CAPTAIN SLABY  
OR BOB CAMPBELL AT X6-0126.

*All required notifications will be done by contractor*

12-1  
12-2  
12-3

- #1 Text modified to incorporate information.
- #2 Comment noted.
- #3 Comment noted.



DEPARTMENT OF THE AIR FORCE  
30TH SPACE WING (AFSPACECOM)

13

Responses to Public Review Comments

MEMORANDUM FOR 30 CES/CEVPP  
ATTENTION: GARRY SANCHEZ

FROM: 30 CES/CEVPC  
Building 7015  
806 13th Street, Suite 116  
Vandenberg AFB CA 93437-5242

SUBJECT: Comments on the Draft Environmental Assessment for the Launch Rate Increase for  
Delta II Program at Vandenberg AFB

13-1 1. Thank you for allowing us the opportunity to comment on the above referenced document.  
My comments are as follows:

F-28

a. Page 4-26, Section 4.9 Due to the depositional nature of the shifting dune sands in  
the area of the proposed road and parking lot construction, monitoring by a qualified  
archaeological contractor and Native American will be required for all ground disturbing  
activities.

2. If you have any questions please call Kelly Minas at ext. 6-0391 or Larry Spanne at 5-0748.

Sincerely

Kelly R. Minas  
Staff Archaeologist

13-1

#1

Comment identical to comment #3 above. Text was modified to include new  
information.

cc:  
30 CES/CEV/CEVP



## DEPARTMENT OF THE AIR FORCE

30TH SPACE WING (AFSPC)

## Responses to Public Review Comments

3 Jul 96

30 CES/CEVPN  
Natural Resources  
806 13th St, Suite 116  
Vandenberg AFB CA 93437-5242

Mr Bill Gorman  
ENSR  
1220 Avenida Acaso  
Camarillo CA 93012

Dear Bill,

I have reviewed the latest draft you sent of the biological resources section. Overall, you have done a good job of incorporating the wildlife data, and I have few comments on the "Affected Environment" section. I have more substantive comments on the impacts section. My recommendations for changes, for those portions of the document pertinent to wildlife, are as follows:

14-1

1. Section 1.4, page 1.8, second bullet: as I discussed with you previously, I am extremely skeptical that video-taping of least terns and snowy plovers during launches would be feasible. It would be possible only if nests happened to be located and clustered in a manner that allowed for getting good camera views of the birds on their nests, yet far enough away that equipment set-up would not disturb the birds. I recommend re-wording this bullet as follows: "Status of nesting western snowy plovers and California least terns will be monitored before and after launches that occur between 1 March and 30 September, to determine if launches impact site use and/or reproductive success. The feasibility of remote video-monitoring of least terns and snowy plovers during daylight launches during the most critical time during the nesting season (between 15 April and 31 July) will also be investigated, and implemented if feasible."

Note that these changes reflect a two-tiered approach to monitoring, with more intensive (video) monitoring between 15 April and 31 July, and pre- and post-launch monitoring through the entire nesting season (1 March-30 September, inclusive of both least terns and snowy plovers). I discussed this with USFWS (Jim Watkins), and it is clear that his intent in identifying a "critical period" was *not* to dismiss entirely the earlier and later periods of the nesting season. Also, with respect to the third bullet, I understand that Jim Watkins' intent is to review the data and monitoring program after five launches; the statement "consultation with USFWS will be reinitiated" implies re-initiation of formal Section 7 consultation.

14-2

2. General comment on section 3.4: I regret that I did not note, in comments to previous drafts of this EA, the lack of a general discussion of wildlife species present in the area. It can be brief, but this overview is a basic part of NEPA documents and should be included. In the admin draft, there was a brief discussion of vegetation found in the area, including common/characteristic species; there should be a parallel discussion for wildlife.

14-3

3. Starting page 3-23; third paragraph: "plover" should be changed to "western snowy plover", at least when the subspecies is first discussed; "snowy plover" may also be used. While this may seem trivial,

OPTIONAL FORM 99 (7-99)

## FAX TRANSMITTAL

# of pages = 3

To: <u>BILL GORMAN</u>	From: <u>NANCY REED</u>
Dept./Agency: <u>ENSR</u>	Phone #: <u>734-5232/58399</u>
Fax #: <u>(605)388-3577</u>	Fax #: <u>734 1339</u>
NSN 7540-01-317-7288	5000-101
GENERAL SERVICES ADMINISTRATION	

These comments were submitted by Ms. Nancy Reed, VAFB wildlife biologist, after she reviewed a revised Biological Resources section.

14-1 #1 The wording was changed as suggested.

The bullet was revised consistent with the comment.

14-2 #2 Additional information on wildlife adjacent to SLC-2W has been included.

14-3 #3 Plovers and terns have been referred to throughout the document as snowy plovers and least terns (except when the full common name is more appropriate). The mountain plover is referred to properly.



## Responses to Public Review Comments

snowy plovers are not the only plover species occurring on VAFB. This applies throughout the document. The same goes for California least terns, which are correctly referred to on page 3-23 but are most often referred to as just "terns" elsewhere in the document.

- |       |  |       |     |   |
|-------|--|-------|-----|---|
| 14-4  | 4. Figure 3-7 and subsequent graphics: the shading on these bar graphs is difficult to interpret; recommend changing to stipples, slashes, etc.; to differentiate data sets. Shading is fine if there are only two data sets (light and dark).   | 14-4  | #4  | The graphs have been reprinted with clearer patterns.   |
| 14-5  | 5. Figure 3-8: Title should be "Snowy Plover Nesting Areas in the Vicinity of SLC-2W" (since the figure does not show all nesting areas on VAFB).  | 14-5  | #5  | The wording has been changed per the suggestion.  |
| 14-6  | 6. Page 3-32, first paragraph: there should be a table identifying candidates and species of concern (such as the Table 3-5 of the admin draft EA). Also, the last sentence of the paragraph doesn't make sense. The impacts section should address impacts to those species those that occur close enough to the site to be affected by construction and/or launch activities, even if these impacts are not expected to be significant, although it is appropriate to devote the most extensive discussion to threatened/endangered species and marine mammals.  | 14-6  | #6  | The referenced table has always been part of the document. Since it did not change substantively, in an effort to save paper, it was not included with the abbreviated copy sent for review.<br><br>The impacts section has been revised to show clearly assessment of effects to both special status and non-special status species.   |
| 14-7  | 7. Page 4-20, Section 4.4.1.1. Construction Impacts: it would be appropriate to insert a brief paragraph pertaining to construction impacts on wildlife (short-term disturbance, potential mortality to sedentary species such as reptiles, etc.)  | 14-7  | #7  | Text has been added to this section as suggested.   |
| 14-8  | 8. Impacts section, page 4-24, last paragraph, 2nd sentence: in my opinion, "may be conservative" is more appropriate than "is likely to be conservative". Along the same lines, recommend deleting the last sentence of the first full paragraph (begins with "Such adaptations..."). Without supporting data, the argument that adaptations that protect the ears of seals from underwater pressure and pressure changes somehow also make them less subject to damage from noise cannot be substantiated. If it were up to me, I would delete both paragraphs entirely. Very little is known about the physical impact of noise on seals. All we really know is that behavioral monitoring conducted to date has not appeared to show any changes in hauling patterns, numbers of seals using the sites, etc. | 14-8  | #8  | The second half of the cited sentence ("Such adaptations ...") has been removed, however, the balance of the paragraphs has been retained. This information provides the listener some, albeit small, basis for understanding a mechanism that could result in reduced impacts to seal hearing from noises. The logic is simple and consistent with that used commonly for hypothesizing physiologic function from anatomic form. |
| 14-9  | 9. Page 4-25, under Observed Reactions, last sentence of first paragraph: according to Stewart et al 1994, the sound level affects not only the number of animals that startle, but also the type and duration of the response.  | 14-9  | #9  | The text has been changed.  |
| 14-10 | 10. Page 4-25, under Inferred Reactions: citations should be noted for this monitoring data. A citation to support the assumption that few seals would have been hauled out during the launch because of tide levels should also be noted (Roest 1995, documented relationship between seal hauling patterns and tide levels at the Spur Road site; such a relationship does not appear to exist at the south VAFB hauling sites). Also, note that although it is possible that harbor seal numbers are reduced at hauling sites at night, studies on VAFB have not yet been conducted to substantiate this.   | 14-10 | #10 | Citations have been added and supplemental text has been added.   |
| 14-11 | 11. Page 4-28, under Sonic Booms: refers to lack of <i>focused</i> sonic booms; there needs to be discussion as to why there would be no noise impact of any kind (focused or otherwise) on the Channel Islands (this has ramifications for endangered species as well as marine mammals). If evidence in previous environmental documents for the Delta II/SLC-2W show a lack of impacts, and launch trajectories under the new program would not differ from launches conducted to date, then this can simply be noted (with appropriate citations).   | 14-11 | #11 | Title has been changed. Additional information on potential impacts to non-special status species has been added. To avoid substantial redundancy, general discussions of impact mechanisms have preceded the discussion of impacts to each category of animal. That organization notwithstanding, separate headings for special status species and other wildlife have been incorporated.  |
| 14-12 | 12. Page 4-28, Impacts to Birds. Recommend including this as a subset under a section entitled Terrestrial Wildlife. Although T&E birds are of greatest concern, the EA should also address other taxonomic groups (and other birds) that occur in the area. Typically, most EA's I have reviewed address general wildlife in one section and threatened, endangered, and other special-status species in another.   | 14-12 | #12 | Title has been changed. Additional information on potential impacts to non-special status species has been added. To avoid substantial redundancy, general discussions of impact mechanisms have preceded the discussion of impacts to each category of animal. That organization notwithstanding, separate headings for special status species and other wildlife have been incorporated.  |

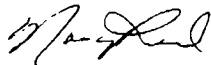
## Responses to Public Review Comments

- 14-13 13. In discussions of noise impacts, it is important to note whether noise values presented are C-weighted (dB) or A-weighted (dBA). I believe that A-weighted values are most commonly used to assess noise impacts to wildlife. 14-13 #13 Where the information was available, it was included.
- 14-14 14. Page 4-30, top of page: it is not true that pelicans do not roost near SLC-2W. During 1995, USFWS conducted monthly counts at California brown pelican roost sites on and near VAFB, from Point Sal/Lion Rock to the south VAFB boathouse. The highest count for any single site was at the Purisima Pt site, approximately 0.75 mile from SLC-2W; 410 brown pelicans were counted there in August 1995. Numbers are highly variable throughout the year, with highest numbers Jun-Dec, but Purisima Point is one of the most consistently used sites (Peretska, D. 1996, *California Brown Pelican Roost Site and Coast Utilization Survey at Vandenberg Air Force Base, Santa Barbara County, California*. U.S. Fish and Wildlife Service.) 14-14 #14 Information on pelican roosting near SLC-2W has been included and the discussion of potential impacts to these animals has been revised.
- 14-15 15. Page 4-31, second paragraph: please replace "active predator control" with "selective predator control, coupled with electric fencing to exclude most mammalian predators". These measures were implemented in 1993 as well as 1994 and 1995 (this should also be noted in Figure 4-6). 14-15 #15 Text has been changed as suggested.
- 14-16 16. Page 4-31 through 33, discussion of least tern trends relative to activity at SLC-2W: no reasonable conclusions, even tentative ones, can be drawn from this analysis. Both before and after the SLC-2 "shut-down", there have been good years and poor years, with respect to both numbers of least terns and nesting success. Also, Figure 4-6 shows no more than one launch during each nesting season, 1978-1984; this project proposes up to three/year between 15 Apr - 31 Jul; at least one additional launch/year could theoretically occur while the least terns are present. Also, the presence of SLC-2 and associated activity likely attracts some predators, particularly crows, to the area, and we have no evidence that predator presence has been higher in "shut-down" years than during years when SLC-2W was active. In addition to predators, many factors affect least terns, including weather and food supply. The most that we can say is that there has been continued occupancy of north VAFB, including the Purisima Point colony site, during and subsequent to years when launches occurred. 14-16 #16 To avoid protracted discussions about data that can be interpreted in many ways, most of which are highly speculative, the third tentative conclusion has been eliminated from the document.
- 14-17 17. Pages 4-34, 4-35: see #3 above. 14-17 #17 Naming of terns and plovers has been revised throughout the document.
- 14-18 18. Page 4-35, bottom of page: see #1 above. 14-18 #18 Bullets have been revised to reflect the comments.
- 14-19 Note typos/misspellings: page 1-9, ninth bullet, should be "half"; change "Pearsons" to "Persons" throughout; page 3-32 third paragraph, type 1st word of 7th line; page 4-24 first paragraph, insert "to between "expected" and "be"; page 4-26 4th paragraph 1st line, insert "in" between "haul out" and "arcas"; page 4-31: "Naydol", not "Naydal". 14-19 In an effort to get the document to the reviewer as soon as possible before her week away from VAFB, a preliminary revised draft was sent before it had had the benefit of a technical edit. The suggested changes in typos and misspellings have already been corrected.

Please note that the above comments are based upon my review only; Al Naydol and Chris Gillespie will still need to review the next draft and may have additional comments.

I can be reached at (805)734-8232 ext. 5-8399 if you have any questions.

Sincerely,



NANCY READ  
Wildlife Biologist  
Environmental Management



DEPARTMENT OF THE AIR FORCE

30TH SPACE WING (AFSC)

17 JUL 1996

## MEMORANDUM FOR ENVIRONMENTAL IMPACT ANALYSIS PROCESS SUBCOMMITTEE

FROM 30 CFS/CEVPP

SUBJECT Draft Environmental Assessment (EA), for Launch Rate Increase for Delta II Program at Vandenberg Air Force Base (VAFB), California.

- 1 Attached for your review and comment is the subject Draft EA (revised preliminary final) dated July 1996, which proposes an increase in the launch rate from two to ten launches annually (maximum), at SLC 2W beginning late 1996.
- 2 Responses to previous comments are provided in Appendix F of the EA. Please ensure that your comments have been adequately addressed in the current document. If you concur with the document as proposed, please provide your recommendation for approval to the Base Environmental Protection Committee (EPC) in the endorsement below and return your response MET 2 Aug 1996. Should you have any questions, please contact me at (805) 734-8232, extension 6-2814.

*G. E. Sanchez*  
 GARRY E. SANCHEZ, GS-12  
 Program Planning  
 Environmental Management

## ATTACHMENTS

- 1 Draft (revised preliminary final) EA
- 2 Draft Conformity Analysis (inbound)

Encl Ind.

TO 30 SW/ET

We recommend approval of the environmental assessment for the launch rate increase for Delta II Program at Vandenberg Air Force Base to the EPC.

Signature

These comments were received upon final review of the Administrative EA.

15-1

No response required.

15-1

F-32

OFFICERS OF THE HIGH FRONTIER

## ENVIRONMENTAL REVIEW SHEET

PROJECT #	PROJECT TITLE DRAFT EA, LAUNCH RATE INCREASE FOR DELTA II	
SUGGESTED REVIEWERS OR ORGANIZATION		
ORGANIZATION COMMENTS/SUGGESTIONS/RECOMMENDATIONS		
CEVFN (Wildlife) -	APPROVED	DISAPPROVED
16-1 1) Table 3-5 should be titled "A partial list of Animals expected to occur near SLC-2W", since many species known to occur near SLC-2 are not included. This table is misleading if it is presented as a complete species list. There are also several mis-spellings here: peregrine falcon, Charadrius montanus, Charadrius alexandrinus nivosus, Zenaida macroura, Aphelocoma coerulescens, Amphispiza belli belli, Sceloporus occidentalis, Crotalus viridis.		
16-2 2) Table 3-7: Townsend's western big-eared bat should be listed as "potential" for both VAFB and SLC-2 vicinity, "yellowthroat" is one word; tidewater goby is Eucyclogobius.		
16-3 3) General comment: please check document to be sure that all cited references and personal communications are properly listed in Sections 5.1 and 7.0. I found several discrepancies and missing references.		
16-4 4) Section 4.3.2.4, Page 4-19: last paragraph is not substantiated. Relatively high-intensity sonic booms, and resulting startle responses by marine mammals, have been documented from south VAFB launches that produced a sonic boom over the Channel Islands. Also, the first bullet in this section seems to make the case that Delta II launches from SLC-2W would not produce a sonic boom over the Channel Islands, and a clear statement is made on page 4-29: "Because the launch azimuth takes the rocket well west of the Channel Islands, no focused sonic booms are expected to occur there". However, in the last paragraph of Section 4.3.2.4, there is a statement "...even though sonic booms from a Delta II would occur over the Channel Islands...". This issue must be clarified. If available data clearly show that the Delta's sonic boom "footprint" would not impact the islands, recommend deletion of all of the last paragraph of this section. If it would impact the islands, threatened/endangered species as well as marine mammal issues must be addressed.		
16-5 5) Page 4-26, 2nd paragraph: this should be deleted unless there is a study that can be cited substantiating the claim that the ear structure of seals protects them from noise impacts.		
16-6 6) Page 4-27, under "Inferred Reactions": although the general conclusions here are valid, better explanation is needed. The relationship of tides to hauling patterns at Puntuma and Spur Road, as documented by Roest (1995), should be noted. Also, there should be a reference to support the assumption that there would be fewer seals hauled out at night than during the day, since this has not yet been studied on VAFB. (Note: in general, my impression is that the word "assume" is too often used in this document without supporting data/references).		
16-7 7) Figure 4-5: should be re-titled. Readers might imply that there were these many launches in a 1-month period. Recommend: "Cumulative Total of all Launches by Month, 1958-1996".		
NR 2 Aug 96		

These comments were received upon final review of the Administrative EA.

16-1 Title was changed. Misspellings are corrected.

16-2 Table was corrected.

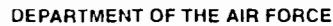
16-3 References have been double checked and included as requested.

16-4 Last paragraph has been modified (as shown in attached fax).

16-5 Paragraph has been deleted.

16-6 Text has been modified (as shown in the attached fax).

16-7 Figure has been retitled.



2 August 1996

P.04



Santa Barbara County  
Air Pollution Control District

July 25, 1996

Mr. Gary E. Sanchez, Program Planning  
Office of Environmental Management  
806 13th Street, Suite 116  
Vandenberg AirB, CA 93437 5242

RE Launch Rate Increase for Delta II Program, Draft Environmental Assessment, July, 1996

Dear Mr. Sanchez:

The Santa Barbara County Air Pollution Control District (APCD) provided comments dated April 22, 1996 on the previously circulated EA for the above mentioned project. The APCD appreciates the opportunity to review the responses to our comments in the July, 1996 Draft EA.

18-1

The conformity analysis in Section 4.1.5 of the July 1996 Draft Environmental Assessment was conducted as described by the commentor. Refer specifically to Table 4-6 for the comparison of project emissions to ten percent of the current regional emissions.

18-1

**Page F-20, Response to Comment # 9-4.** The commenter is correct in noting that the EPA has suspended consideration of the Maintenance Plan described in the 1994 Clean Air Plan (CAP). Consequently, the allotment for growth in emissions at VAFB is no longer applicable for use in conformity analyses. It appears that a conformity analysis is being used erroneously to determine the significance of cumulative impacts. As we stated previously, to determine the significance of the cumulative impacts of a project, the project's emissions must be compared to the 1996 growth factors in the 1994 Clean Air Plan, which were based on VAFB's Base Comprehensive Plan. When doing a conformity analysis to determine that the project's emissions are not regionally significant (40 CFR 51.853(i)), they must be shown to be less than 10 percent of the 1996 inventory in the 1994 CAP.

18-2

In addition, the EA should note that in May, 1996, three violations of the federal ozone standard were recorded in Santa Barbara County. Taken together with the exceedances recorded in 1994 and 1995, the County may be considered to have failed to attain the federal ozone standard as required for a "moderate" nonattainment area. Since the ozone standard cannot be attained by the statutory deadlines (by 1996) the County may be reclassified to the next highest nonattainment category namely, "serious" under the federal Clean Air Act. A "serious" classification requires more stringent regulatory and planning requirements. We are working with the EPA and CARB as they determine the implications of the recent ozone standard exceedances on the SIP approval process.

18-2

The SBCAPCD comment regarding recent violations of the federal ozone standard and the resulting potential for reclassifying the County as a "serious" nonattainment area are noted. This reclassification would change the *de minimis* NO<sub>x</sub> and ROG emissions levels for a conformity demonstration (see Table 4-6 of the July 1996 Draft Environmental Assessment) from 100 tons per year to 50 tons per year. Since the project emissions of NO<sub>x</sub> and ROG are less than one ton per year, this would not change the conclusions of the conformity analysis.

Again, thank you for the opportunity to review the draft EA for this important project. We look forward to receiving the final EA with responses to our comments. Please call me at (805) 961-8893 if you would like clarification on the above comments.

Sincerely,

*Vijay Jammalamadaka*

Vijay Jammalamadaka  
Air Quality Specialist  
Technology and Environmental Assessment Division

cc Project File (VAFB, Delta II Program)  
TEA Chron File

H:\GROUP\CA\W\PARCORR\VA\B\DLT2 EA

Douglas W. Allard Air Pollution Control Officer  
26 Cantilan Drive B-23, Goleta, CA 93117 Fax: 805-961-8801 Phone: 805-961-8800

Don't Forget to Sign the Air

U

These comments were received upon final review of the Administrative EA.

19-1

Gang -  
I sure hope this is the last time this comes around! Section 3.5.4, pg 3-36 discusses the nature and depth to contaminated GW but does not address the necessity to avoid GW contact during construction or what would happen if GW is contacted (sampling and disposal strategies). In my opinion, the necessary contingencies have not been adequately planned for.

Ann Bagwell  
IRP 7/30/96

19-1

Comment withdrawn, requested text already in document on pages 4-39 and 4-40.

F-36



DEPARTMENT OF THE AIR FORCE

30TH SPACE WING (ATSPC)

17 JUL 1996

MEMORANDUM FOR ENVIRONMENTAL IMPACT ANALYSIS PROCESS SUBCOMMITTEE

FROM: 30 CESSCEVPP

SUBJECT: Draft Environmental Assessment (EA) for Launch Rate Increase for Delta II Program at Vandenberg Air Force Base (VAFB), California

20-1 Attached for your review and comment is the subject Draft EA (revised preliminary final) dated July 1996, which proposes an increase in the launch rate from two to ten launches annually (maximum), at SLC 2W beginning late 1996.

2. Responses to previous comments are provided in Appendix F of the EA. Please ensure that your comments have been adequately addressed in the current document. If you concur with the document as proposed, please provide your recommendation for approval to the base Environmental Protection Committee (EPC) in the enclosure below and return your response NLT 2 Aug 1996. Should you have any questions, please contact me at (805) 734-8232 extension 6-2814.

*Garry E. Sanchez*  
GARRY E. SANCHEZ, GS 12  
Program Planning  
Environmental Management

Attachment:

1. Draft (revised preliminary final) EA
2. Draft Conformity Analysis (inbound)

29 Jul 96

1st Ind.

10 - in SW/EF

We recommend approval of the environmental assessment for the Launch Rate Increase for Delta II Program at Vandenberg Air Force Base to the EPC.

*John J. [Signature]*  
Signature

GUARDIANS OF THE HIGH FRONTIER

These comments were received upon final review of the Administrative EA.

20-1

No response required.

F-37



August 5, 1996

Final Comments of The Office of the Associate Administrator for Commercial Space Transportation on the Draft Environmental Assessment of July 1996, Launch Rate Increase for Delta II at SLC-2, Vandenberg AFB

- |      |      |   |      |                          |
|------|------|---|------|--------------------------|
| F-38 | 21-1 | Reference pg 1-7, 1st paragraph, last sentence, regarding "this proposal ..is the most cost-effective use of present facilities ..." Statements alleging optimal cost effectiveness may appear as a marketing ploy that is irrelevant and normally without substantiation in an EA. For this reason, we request a change to read, "This proposal to launch additional payloads on an annual basis is a reasonably cost-effective use of present facilities and ..." This will help avoid a statement which suggests undue favoritism or bias is being demonstrated by government agencies in an EA. | 21-1 | Text changed.            |
|      | 21-2 | Reference pg 2-12, section 2.3.1.4, 3rd line. Recommend 861,000 be entered for the missing value.   | 21-2 | Text changed.            |
|      | 21-3 | Reference pg 2-16, 3rd full paragraph, 1st line. Recommend "infeasible" be changed to "impractical." This indicates the use of existing facilities elsewhere on VAFB were impractical given a set of constraints which may admittedly change.   | 21-3 | Text changed.            |
|      | 21-4 | Reference pg 2-18, 1st paragraph, last sentence, regarding "the SLC-7...would involve greater environmental impacts during construction...and...may or may not have the potential for reduced environmental impacts during operation." Note, available information allows a question to arise as to whether the comparison is valid, but we believe the issue is of no consequence since the chosen action need not be the environmentally optimum selection.   | 21-4 | Comment noted.           |
|      | 21-5 | Reference page 4-3, 1st paragraph, 3rd sentence. Correct the sentence to give appropriate values in the respective order. The bottom and top of the stratosphere are commonly given as 15 km and 50 km, respectively.   | 21-5 | Comment noted.           |
|      | 21-6 | Reference page 4-3, last paragraph, last sentence. Recommend deletion. Deletion will help avoid trying to define a level of hydrogen chloride that a typically unhealthy person could endure without detrimental effects. The questionable notion is superfluous having been given information which precedes the statement.  | 21-6 | Text deleted.            |
|      | 21-7 | Reference page 4-19, section 4.3.2.5, 1st sentence. Recommend deletion of "minor." Although short-term exposure to about 130 dB reportedly presents no serious problems..." We believe it is an understatement to suggest the effect would be limited to minor annoyance for all individuals. This suspicion is strengthened by OSHA limiting noise exposure to workers to 115 dBA for a period of no longer than 15 minutes (29 CFR 1910.95).  | 21-7 | "Minor" changed to some. |
|      | 21-8 | Reference page 4-36, last paragraph, last sentence. Recommend adding commas to improve the flow of reading (e.g. ...during the critical period, much less a launch every five weeks, is remote.).   | 21-8 | Commas added.            |